

Platform concept on talk

FOUR years after his innovative floating production concept the X-leg platform was first shown in public, industry veteran Phil Abbott is encouraged by positive feedback from at least two major organisations that have taken a look at it, and by continuing interest from significant names in the business such as engineer IntecSea, fabricator Kiewit and driller BassDrill.

He is now looking for support from industry to develop this ultra-deepwater concept further.

To that end he has been pursuing a whole host of targets, including most of the operators in deep-water technology development programmes such as Deepstar and RPSEA.

"We want to take the structural design to a point where we can get a reasonable estimate from a fabricator like Kiewit," he says.

Abbott is no stranger to the deepwater floating production business. He rounded off his full-time engineering career with 13 years at Technip in Houston, where he helped develop the company's extendable draft platform proposal and even has his name on a couple of patents related to it.

Before that, he spent 16 years with Brown & Root, with much of that in the UK during the heyday of North Sea activity.

Shortly after his retirement five years ago, Abbott says he was idly contemplating a foldable TV tray across the room.

"Suddenly it dawned on me this is exactly what we need for an offshore platform. We need something flat that can float out of shallow water and then unfold offshore to make an ultra-deepdraft semi-submersible," he recalls.

"The first thing I did was to seek the opinion of a friend," Abbott adds. This was Dr Larry Russell, an independent consultant in Houston for more than 30 years, who became his co-inventor on the X-leg platform (XLP) and has concentrated on the all-important area of the huge pins required in the concept.

These two have since been granted a US patent for their design and have assigned those rights to a holding company named Deepwater XLP Technology, with Abbott as president.

They hope the platform can shape up as a serious challenger to spars and other forms of deep-draft semisub. They claim their invent-

Inventor looking to take new X-leg floating production idea for ultra-deep to next level

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tion has far more deck area than competing forms of ultra-deepwater floaters, so that it can easily accommodate two drilling rigs as well as facilities for production.

They also reckon that the motions of the XLP are comparable to those of a spar, meaning that it is possible for it to support dry trees using long-stroke tensioners at deck level. It can also support steel catenary risers from subsea wells.

They foresee a time when standard dual-rig designs of their platform will be used for both drilling and production.

They talk in terms of two main variants, both with two rigs, but one outfitted for drill-

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ing, extended well tests and early production, and the other for final production.

They believe an operator might lease a drilling variant of XLP for appraisal, extended well tests and early production and then after a couple of years replace it with an operator-owned production variant that can complete and workover wells, do sidetrack drilling, and at the same time handle full production.

If the two platforms happen to use the same size hull they can even use the same pre-installed moorings.

"Basically owners could pay for the drilling phase with the oil that they sell from early production at the same time," says Abbott. "What we are proposing provides a tremendous amount of flexibility, speed and early cash flow."

He and Russell also hope that because of its very large deck area, and the fact that

it can fold up and return to port with a full deck load, the XLP design will prove attractive to potential platform leasing contractors.

By leasing during early phases, an operator can greatly reduce the risks associated with reservoir realities, they point out.

The draft of the platform while being towed away from an assembly yard is less than six metres. This means an XLP can be assembled by almost any offshore jacket fabricator in the world, and can provide great benefit in local content opportunities.

This includes in the Gulf of Mexico area where it has so far proved difficult to come up with deep-water platform designs suited to construction at yards along its shallow coast.

The deck is considered easy to build and outfit, as are the support legs. "We anticipate that cost per tonne to fabricate, assemble and install an XLP will be about two-thirds that of the current dry tree platform designs now being considered," says Abbott, though he does not claim it will be the lightest design available.

At the end of 2007, engineers working for IntecSea proved the feasibility of an XLP supporting 11,000 tonnes of topsides by estimating its geometry and weights and using a computer model to make predictions of wave-induced motions.

They concluded it was technically feasible, had superior motion characteristics, and that fabrication and erection characteristics should be cost efficient.

Before that, in 2006, Shell had investigated the concept by doing a preliminary design of a much larger size platform and also concluded it was feasible. The next step in development will involve preliminary structural design and analysis, building on that earlier work.

Perhaps only two different sizes of XLP will be required, each to a standard design. "The concept has three unique key features," says Abbott.

"These are its minimum motions, its very large deck area, and its ability to leave and return to a shallow-water port with a full deck load."

Simple structure gets in the swing on location

THE X-leg platform can be likened to a giant folding tea-table.

It uses a relatively simple steel barge at the surface that provides buoyancy during float-out and a deck area large enough for topsides equipment to be laid out in a single level.

"The support legs are also very simple to build. They are ring-stiffened tubulars that can be fabricated low to the ground, and the work is very repetitive," says platform creator Phil Abbott.

The cost of the pins, which serve as main pivots and to attach the leg ends to the deck and lower heave plate, is likely to be high.

However, this is more than offset by removing the need for an expensive heavy-lift crane vessel at location, the ability to pre-commis-

sion topsides before float-out, and the fast construction schedule.

The legs do present a larger area against currents than an equivalent truss spar, so moorings could be costlier. But the spectre of vortex-induced motion in high currents does not hang over the XLP in the way that it does over a cylindrical spar hull.

When the time comes to join the deck and lower hull, "you can float the two together at an inshore site next to a quay and connect them in a few hours", says Abbott. The support legs have a diameter of about 10 metres and are likely to be a little over 100 metres long.

In initial configuration, the first of the two three-leg frames that form the X is pinned at one end to the lower heave plate, and also zconnected to the second trio of legs by the main pivot pins. Once the top ends of the first

frame legs have been pinned to one side of the deck by activating hydraulic rams, the whole assembly can be towed off to deep water with all six legs trailing on the surface in a nested array at minimum draft.

In deep water the assembly sequence starts with water ballasting so that the second frame rotates about the pivot pins until the lower leg ends can be pinned to the heave plate.

The resulting rigid structure is then swung down beneath the deck and brought up the other side of that deck, using a little assistance from winches. The last three connections are then pinned there.

When the platform reaches final location, the upper parts of the legs are deballasted until the deck barge has been raised out of the water to the required air gap.

