Centralization – Dorsal Series No 1.

The Middle

The first fixed offshore installation (as we would recognise it) was installed in 1937, one mile out into the drink off of Calcasieu Parish, Louisiana. This installation proved that it was possible to have a permanently installed structure offshore rather than drilling from wooden piers or artificial man made islands.

- History of conductors and caissons
- The need for guides for conductors and caissons
- The challenges that guides pose

Once installations started being put in the water there was a need to protect the production from the worst of the weather and from the sea. Enter the conductor! Conductors had been used onshore since 1859 to prevent the wellbore from collapsing. Offshore conductors are steel pipes embedded (driven or drilled) into the seabed and cemented in, then the rest of the casing goes in. These conductors are important structural components of a well and they get a hiding from wave impact. Instead of the surface, intermediate or production casing getting smashed about by the waves - the conductor is the flak jacket taking the hits.

Centralization of caissons is a story that dates back to the First Industrial Revolution (allegedly) and if my tutors are marking this then I'll get battered for citing Wikipedia as a source. These are of course civils caissons and aren't exactly what we're talking about here in terms of their use.

Caissons in the Oil and Gas game are used for a number of functions - discharge of waste (oily and otherwise) but the caissons that get the most attention from an integrity standpoint are usually housing other more sensitive pipework (risers) and umbilical(s) or pumps for the firewater. For the purposes of the article we're going to ignore pump centralization - although if your pumps are rattling about, you should probably sort that out.

So, while Walter Disney was getting ready to fire out his first full-length animated feature (Snow White), the offshore game was about to kick off.

The first fixed installations were in very shallow water - we're talking about 4.3m (15ft) so I can almost guarantee that no one was thinking about centralization when they were built. I've looked around the interweb and I can't actually see when Conductor Guide Frames (CGFs) were first used. The first patent I can find is from 1983 (and it doesn't look like anything we'd recognise as a modern guide) however guides were in use before this as I've looked at platform elevation drawings from 1974. These drawings appear as though they were created by a doctor, using their non-dominant hand, who was only familiar with Sanskrit and has an ardent fear of calligraphy. Which seems to be typical of drawing offices in the 70's in the UK.

Whatever the history Conductor guides, they broadly follow two design layouts:

- Upper funnel, barrel and lower funnel
- Upper funnel and barrel only

The upper funnel acts as a guide for the conductor, a guide for the guide if you like. The barrel of the guide is where the action happens in terms of restricting the motion of the guide during operations.

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Whichever form is used the guides are attached to the structure via welding or bolting dependent upon if they are being installed from new or retrofitted to an existing jacket.

The necessity for CGFs is dictated by the environmental factors as well as the length of the span between the wellhead and the seabed. As fixed installations got into deeper water and where the environmental factors dictated it guides were installed for a few major reasons:

- Spacing out the conductors during drilling (get them where you want them to be and ensure no clashes
- Restricting the lateral motion of the conductor (it's a big bit of spaghetti in the water column)

Once the conductor has been driven in during installation it's then left to its own devices right? Well, no. If there's a large gap between the conductor and guide it will cause some issues to occur. A conductor has a significant mass and once it's moving, it takes a lot of force to stop it once it clashes with a guide, leading to:

- Fretting of the conductor
- Damage to the guide
- Damage to where the guide attaches to the jacket framing - cracking welds etc.
- Vibration migration to the structure - following impact with the guide
- Excessive movement at the wellhead - leading to failure of small bore pipework attached to the XTree

The story for caissons is very similar - they obviously don't have an XTree at the top of them and they aren't going to the seabed but in addition to the other issues above:

- Damage to pumps - where they are present
- Internal damage to the caisson where the pump is rattling off the inside of it

I'll go over the types of centralization available, the pros and cons, retrofit versus new etc. etc. in future articles because there's a decent amount to cover off.

In sum: it doesn't always seem like a big deal because its not an immediate problem but inadequate centralization can lead to large problems.

To your continued safe operation and successful scope execution



Mike Killeen

Contact Me

The title is from Jimmy Eat World, Bleed American, 2001