

Case Study InSafeJIP (Joint Industry Project)

Guidelines for the Prediction of Geotechnical Performance of Spudcan Foundations during Installation and Removal of Jack-Up Units



PROJECT OUTCOME

New guidelines for engineers to use in their daily prediction of whether a jack-up unit is safe to install, operate and remove from an offshore oil and gas site.

WHO'S INVOLVED?

InSafeJIP was a Joint Industry Project (JIP) established by three universities – The University of Western Australia (UWA) through the Centre of Offshore Foundation Systems (COFS), University of Oxford (Oxford) and National University of Singapore (NUS), and engineering consultant RPS Energy – to work with 19 offshore oil and gas companies and government regulators.

Under the JIP, the universities reported on the benchmarking of the latest research on jack-up installation and extraction of jack-up platforms against the offshore data sets provided by the project participants.

This 2-year project was funded by the 19 oil and gas partners and was dependent on data sharing between the partners.



WHAT ARE JACK-UPS?

Jack-ups are mobile drilling units that perform the majority of offshore drilling (oil and gas wells) in water depths up to around 150m.

The rigs are so named because they are self-elevating with three, four, six and even eight movable legs that can be extended (“jacked”) above or below the hull to up to

between 170m and 180m. Spudcan foundations – inverted cones mounted at the base of each of the legs – provide stability to lateral forces on the jack-up rig when installed on the ocean-bed.

WHAT'S THE ISSUE?

There is a perception within the industry that modern jack-ups have lower reliability (safety from structural failure) than traditional fixed offshore platforms, with the majority of the accidents attributed to geotechnical failures. These can lead to rig damage, lost drilling time, and injury to personnel.

The consequential cost to industry is estimated to be between US\$10 million and US\$30 million per geotechnical incident which occurs on a scale of between 5 and 10 times per year.



WHAT WERE THE OBJECTIVES?

The objectives of the study were:

- ▶ Review the available spudcan penetration prediction, extraction and ground preparation methods.
- ▶ Collect, process, catalogue and analyse jack-up foundation performance case study data sets.
- ▶ Calibrate the predictive and ground preparation methods with the case records.
- ▶ Assess and determine the best methods for improving the reliable prediction of jack-up installation and removal.
- ▶ Codify the above in a way that is readily accessible to analysts, and produce an up-to-date set of geotechnical site assessment and operational guidelines.
- ▶ Identify gaps in knowledge and experience and recommend future R&D work to close the knowledge gaps.

In summary, the overall objective was to investigate and develop improved jack-up geotechnical procedures for site assessment, ground treatment and foundation performance prediction and incorporate these within a guideline document.

WHAT MADE THIS A SUCCESSFUL PROJECT?

For the first time, companies across the industry - including operators hiring jack-ups, jack-up owners, jack-up builders, engineering consultants and government regulators - shared data with the aim to create one database of information. All the participants now have a database of over 150 cases which it is still building on.

All parties had one outcome in mind, to have better guidelines which would bring about safer installations going forward.

WHAT WAS THE OUTCOME?

"InSafeJIP" Improved Guidelines for the Prediction of Geotechnical Performance of Spudcan Foundations during Installation and Removal of Jack-Up Units report was released in March 2011.

The guidelines are now being widely used across the oil and gas industry for the safe installation and removal of jack-up units and are available for free download via the following weblink:

bit.ly/insafejip-guidelines

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