

Rig buggies reduce mobilization times for onshore rig

THE USE OF Rig Buggies is a pioneering concept to reduce rig relocation time in onshore drilling. The principle objective is to relocate the rig without dismantling any of the principal components, working in safe conditions, with extremely short transfer times and ensuring good economic results in line with the terms of the contract.

An ingenious system allows the facility to be raised and at the same time with the help of 'Buggies', independent trolleys on self-steering wheels deployed on either side of the rig, to move it in the direction required. A rig weighing over 400 tons is raised evenly.

The time required from release of rig from a wellhead to commencement of drilling operations at the next assigned well site, usually about 50 to 100 m away, is about 40 hours. With improvements, there is scope for reduction of this time to about 35 hours.

Presently this concept is successfully applied in the Qatif field in Saudi Arabia and has won the praise of one of Saipem's most prestigious client, Saudi Aramco.

DEVELOPMENT

Normally, moving a land rig from wellsite to wellsite would necessitate extensive dismantling of the rig piece-by-piece, relocation and re-erection at the new drill site. In this conventional method, the time duration of this relocation from existing drill site to the new drill site is considerable.

Drilling contractors undertake extensive measures to optimize this operation to enable commencement of drilling operations at the new drill site in the shortest possible time.

In Saudi Arabia, Saipem was faced with such a scenario: how to reduce the relocation time. A working group was established with the task of designing and implementing the best solution.

The group set out with energy and commitment, developing synergies and



With Rig Buggies, the time required to move the rig to the next well-site, usually about 50-100m away, is about 40 hours, although there is scope for reducing this time to about 35 hours.

sharing expertise with other companies within the group.

After considerable brainstorming, they decided to look at how to relocate a drilling rig without dismantling any of the principal components, working in safe conditions, with extremely short transfer times and ensuring good economic results in line with the terms of the contract.

The result was Rig Buggies, an innovative way to move drilling rigs.

RIG MOVING SYSTEM

In order to reduce the time involved in the relocation, special transportation vehicles, trolleys called Buggies, are

deployed operating on each side of the drilling rig to move the rig itself without the need for any major dismantling.

Two pairs of double pad-eyes are installed, both in front and rear, through the webs of the rig's skid beams. They are connected using wire ropes to two corresponding lifting tubes, which is the principal lifting structure (and also the primary load bearing equipment).

The lifting tubes are then jacked up, drawing up the rig and allowing its relocation. The lifting tubes are a pair of tubular elements approximately 22.5 m long and 56" in diameter, except the last 4.5 m at each end, which are 42" in diameter.

These are fixed to the front and rear sections of the substructure by eight ties with brackets and eye-bolts to create a single support made sturdy by two support blocks placed symmetrically on the smaller axis of each trolley.

The blocks are supported by a rectangular frame of steel H-beams. Each trolley has eight pairs of wheels with hydraulic drive and a dynamic fluid system for independent steering, allowing for greater freedom of maneuvering around any obstacles on the terrain.

On the hub connecting each pair of wheels is a hydraulic jack with 200 ton capacity.

The symmetric configuration of the four jacks keeps the frame rectangular and provides uniform lifting power, which is regulated by a hydraulic control system.

The wheels, supplied by the aeronautical industry, are of special type and characteristics (rubber, compound, tread, threading, vulcanization, operating pressure, etc.) as they need to work under extreme conditions.

A team leader is in charge of lifting, moving and relocation of the rig. He coordinates with the trolley operators while the rig is shifting to the new location which is already prepared with tim-

ber matting and landmarks for the substructure and the well center.

SYSTEM OPERATION

Prior to moving the rig, initial dismantling operations are required as in conventional methods (such as disconnecting lines - mud, water, cement jobs, instrumentation, BOP controls, etc., and removal of loose material and equipment - walkways, ladders, chutes, pipe racks, etc.).

Another preparatory stage is required: the soil between the substructure and mud pits is restored, correcting compactness level, if necessary.

Then, the ground on both sides of the substructure, as well as the initial part of the route to the new location, is also covered with smooth metal sheeting so that the trolleys move over an optimal surface with less resistance to traction.

The final stage concerns the exact positioning of the four trolleys with their

respective blocks. Each block has a precise point of contact on the tubular element, determined by analysis of the loads and corresponding reactions.

The principle objective of the Rig Buggie is to relocate the rig without dismantling any of the principal components, working in safe conditions, with extremely short transfer times and ensuring good economic results in line with the terms of the contract.

At the end of the preparatory phase, the engines are started and immediately, the hydraulic jacks begin pushing up and, imperceptibly, the rig, weighing more than 400 tons, is raised up evenly.

As soon as it has reached the height necessary to clear the wooden support

blocks under the substructure (about 5 cm), the trolleys start to move towards the new position, usually about 50 to 100 m away.

This innovative procedure has been successful in Saipem's land drilling operations in Saudi Arabia, playing a prominent role in its drilling activities there. Further improvements can bring down the relocation time to around 35 hours, maintaining the same safety standards.

Moreover, this procedure ensures maximization of safety and quality optimizing costs with concurrent reduction in rig up/down and rig move time and most importantly achieving full satisfaction of client.

REFERENCE

This article is based upon IADC World Drilling 2003 paper *Rig Buggies - An Innovative Way to Move Drilling Rigs in Saudi Arabia* presented by **C Bottazzi** and **B Pini** with **Saipem SpA**. ■