



Hollow rods for progressive cavity pumping introduced in offshore operations

Tenaris supplied hollow sucker rods with flush connections in order to enhance the operation of a directional well in an offshore platform located off the Californian coast.

Summary

Most offshore wells are directionally drilled to effectively develop a reservoir. When rod driven Progressive Cavity Pumping (PCP) systems are applied for artificial lift, friction between rotating conventional steel sucker rods and tubing can create rod parts, tubing holes, or even lead to parted tubing. Given the high intervention costs in offshore platforms and usual delays in mobilizing for repair, reducing the rate of interventions in the well is a top priority.

For DCOR LLC, Tenaris's products and technical support were key to reducing the incidence of tubing failures and intervention costs for an offshore well.

Challenges

In search of reliability offshore

Located off the coast of California, Platform Hillhouse well 20A (HH-20A) was completed in 1971. It was operated as a flowing well, gas lifted, and lifted with electric submersible pumps. Following lower zone abandonment and recompletion up hole, it was best lifted with surface driven progressive cavity pumps.

The well was converted to PCP lift in 1994 due to low volume inflow with some sand production. Typical run time before failure was less than 180 days. Installations usually used 2 7/8" 8RD EUE tubing with 1" Grade D rods, slim hole spray metal couplings and rotating rod guides. Workovers generally required the replacement of at least a segment of sucker rods and tubing. Between April 2002 and September 2004, five interventions were recorded. In all of them, high rod-tubing wear was found due to dog leg severity up to 7.4 °/100 ft.

PROJECT PROFILE

Location

Hillhouse platform,
Ventura, California,
United States.

Products highlighted

HolloRod™ 1000

ACCESSORIES:

- Pup Joints
- Crossovers
- Nipples

Well characteristics

Offshore - Directional

MAX DOG LEG SEVERITY:

7.4° / 100ft

PUMP DEPTH:

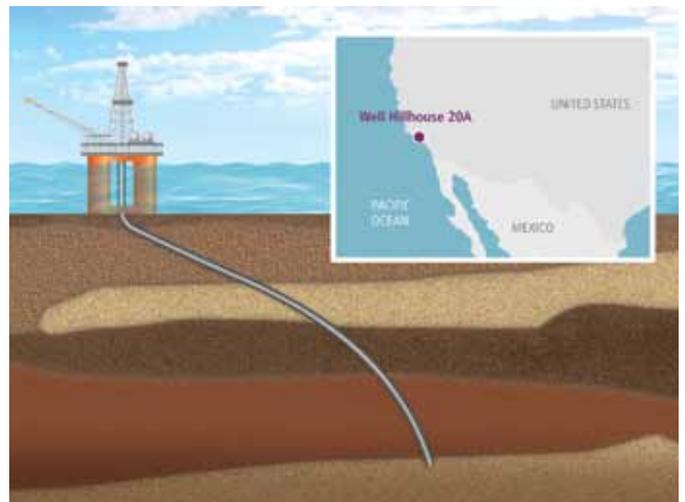
1140 ft (348 m)

FLOW RATE:

215 bpd (34 m³/d)

Services provided

- String design
- On-site technical assistance



Solution

DCOR LLC needed a PCP solution that would minimize the rate of interventions in its well, and reduce the deferred production that resulted from down time. In October 2004, DCOR LLC, supported by Tenaris's technical assistance team, installed a rod string with HolloRod™ 1000 in order to increase operational reliability.

Minimizing rod-tubing wear and tear

Since conventional rod connections have a bigger OD than the rod body, rod-tubing friction is concentrated at the rod coupling, producing localized wear that reduces the tubing wall, which would result in holes in the tubing and in a reduction in the tubing capacity to withstand solicitations. This was the case of well HH-20A. The flush connections in hollow rods distribute side-loads much more evenly throughout the length of the tubing, decreasing the concentrated wear caused by friction and its related damage.

A trustworthy technology

The HolloRod™ Series is specially designed for PCP applications in the most demanding environments.

Tenaris's hollow rods provide more operational reliability as they:

- Diminish premature failures due to rod-pin breakage
- Reduce the backspin effect
- Enhance torque transmission, reducing stick-slip effect
- Avoid using centralizers that could fail and compromise the operation

Results

Significantly lower downtime

The application of this system resulted in a reduction of 50% in overall annual interventions. Downtime per failure averaged 21 days. Therefore this meant a 21-day increase in production annually, plus a reduction in personnel exposure to well workover activities.

Tubing life substantially increased

After using HolloRod™ 1000 for more than five years under similar loading levels, the tubing average lifespan of well HH-20A was increased from 7 months per run, using conventional 1" rods with rotating guides, to 21 months per run.

Tubing was then changed only as a preventive measure, without failures taking place. For instance, 40 months of continuous operations with HolloRod™ 1000 went by before tubing was changed as precaution.



▲ HolloRod™ 1000: Flush connection rod for Progressive Cavity Pumping.

While, as a reference, the longest time-to-failure of the tubing column using conventional guided sucker rods had been 16 months.

Longer rod life, less well interventions

The PCP system gained more reliability by using HolloRod™ 1000: while the conventional rod average lifespan was 11 months, the hollow rods average lifespan was 25 months. This 125% gain in average working life meant material savings and less workover interventions for DCOR LLC.

Thanks to the introduction of the flush HolloRod™ 1000, DCOR was able to reduce material replacements (sucker rods and tubing) and interventions of its HH-20A directional well, improving personnel's safety at the same time. This led to an increase of the well's productive time and a reduction of its total cost of operation (TCO).



For contact information, please visit our site:

www.tenaris.com