Engineered Perforating Solution Saves Operator 13 Days Valued At $7.8 Million

CASE STUDY

OIL COMPANY CHALLENGE

Perforate the inner 9 5/8 in. casing of a well whose bottomhole temperature ranged between 300°F - 400°F using the largest possible diameter gun system to deliver 0.7 in. entry holes and less than 0.1 in. damage to the inner surface of the 13 3/8 in. outer casing.

OWEN SOLUTION

Develop, test, validate, build and deliver a unique gun system with the required performance characteristics.

SUCCESSFUL RESULTS

A custom PAC™ casing puncher system was designed that exceeded the client's requirements. On the first well, a 7.0 in. diameter 21-ft gun loaded 18 shots/ft with HMX explosives was fired successfully saving 13 days of on-site work compared with section milling. A successful cement plug was squeezed through the perforations to fully comply with abandonment regulations. Entry hole size averaged 0.75 in. and actual damage to the 13 3/8 in. casing was 0.01 in. to 0.015 in.

TIME SAVED = $7.8 million

Owen Oil Tools
P.O. Box 568, 12001 County Road 1000
Godley, Texas 76044
P. 800.333.6936 - www.corelab.com/owen

PAC™
PLUG & ABANDONMENT - CIRCULATION

Owen Oil Tools' Energetics Technology Group undertook a special project for a major North Sea Service Company. Owen's new PAC™, was designed, tested and produced to enable the operator to penetrate the inner string of two concentric casings as part of an abandonment program previously enabled by a time-consuming section milling technique.

Once the physical limits (9 5/8 in. casing ID) were considered, the engineering team addressed charge and gun system variables to achieve the requested performance. Maximum gun size imposed by the casing ID was 7.0 in. To ensure hydraulic isolation, the operator requested an 18 spf shot density to maximize communication of cement to the annulus.

Explosive load, stand-off and shaped charge liner design along with casing properties were considered to determine entry hole size and depth of penetration. Centralization using a traditional bow-spring or solid fin stand-off ensured equal 360-deg performance around the casing.

Single prototype charges were tested using gun carrier sections and concentric casing targets under worst-case conditions to assess ballistic results.

Tests confirmed the through hole size and damage to the outer string were within specifications. (**Fig. 1**)

A full system test confirmed that results could be achieved in a fluid-filled environment. Gun swell was checked to ensure the fired gun would not become stuck in the 9 5/8 in. casing. The last step was making a full production run of gun systems to satisfy the operator's needs.

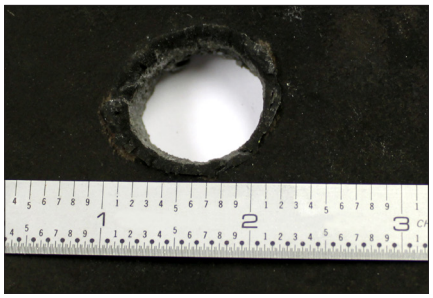

Figure 1: Single charge test results (9 5/8 in. plate above, and 13 3/8 in. plate below)