

MaxFire® Electronic Firing System Enables Operator to Perforate Deepwater Well in the Gulf of Mexico

MAXFIRE SYSTEM EXCEEDS EXPECTATIONS UNDER EXTREME CONDITIONS AND SURPASSES PERFORATING RECORDS

GULF OF MEXICO

CHALLENGES

- » Perforate a deepwater well at a depth where pressures exceeded the limits of other tools and equipment
- » Provide a safe, flexible, and precise low-actuating-pressure EFS

SOLUTION

MaxFire® EFS, which is pressure rated to an industry-leading 40,000 psi (275 MPa), but can be set up to actuate with low pressure in order to perforate the well safely without exceeding the pressure limitations of other downhole tools and equipment

RESULTS

- » Perforated interval at 28,219 feet (8601 meters) TVD, with a temperature of +/-300°F (150°C), pressure of 21,696 psi (1496 bar), and 550-psi (38-bar) overbalance
- » Initiated the perforating gun with a low activation pressure, so that pressure limitations of other tools and equipment were not exceeded
- » Safely carried out other pressure-required operations, such as pressure testing, prior to initiating the gun
- » Successfully completed the job, enabling the operator and Halliburton to each surpass individual perforating records

OVERVIEW

A Gulf of Mexico operator needed to perforate its deepwater well at a depth for which standard perforating solutions were not feasible. Because of extreme downhole conditions, the operator was worried about exceeding the pressure limitations of other tools and equipment downhole during the perforating event. Through close collaboration with Halliburton, the operator chose to use the MaxFire® memory-based electronic firing system (EFS) because of its safety, flexibility, and ability to actuate at low pressure. The job was successfully executed as proposed, resulting in both the operator and Halliburton achieving perforating records – the operator for the deepest true-vertical-depth (TVD) well, and Halliburton for the deepest well perforated with an EFS.



The MaxFire® electronic firing system helped both the operator and Halliburton achieve perforation records in the Gulf of Mexico.

CHALLENGES

The Gulf of Mexico operator needed to perforate its deepwater well at a depth for which standard perforating solutions could not be used. Because of extreme downhole conditions (high pressure, high temperature, and corrosive fluid), the operator was worried about exceeding the pressure limitations of other tools and equipment downhole during the perforating event. Consequently, the operator needed a safe, flexible, and precise low-actuating-pressure firing system.

SOLUTION

The operator collaborated with Halliburton for a solution. The MaxFire memory-based EFS was the answer to meet these challenges. This tool is a safe, precise, and adaptable EFS that can initiate a gun system through a predetermined sequence of pressure cycles. The MaxFire EFS is pressure rated to an industry-leading 40,000 psi (275 MPa), but can be set up to actuate with low pressure. Firing can be aborted with reset pressure at any time, and the tool can last up to 30 days in extreme downhole conditions. It can either be run on the top or bottom of the gun.

The MaxFire EFS is designed with safety in mind. It can initiate at a predetermined sequence of pressure cycles, which allows the flexibility for other pressure-required operations to be conducted safely prior to perforating the gun or carrying out other pressure-required operations, such as pressure testing.

RESULTS

The MaxFire tool successfully initiated the perforation string with low actuating pressure in this deep, high-pressure/high-temperature (HP/HT), TVD well without exceeding the pressure limitations of other downhole tools and equipment.

This well was perforated at 28,219 feet (8601 meters) TVD, and with a temperature of +/-300°F (150°C) and pressure of 21,696 psi (1496 bar). The MaxFire EFS initiated the perforation gun with a low activation pressure of 550 psi (38 bar) in a heavy and corrosive calcium bromide wellbore fluid environment, allowing Halliburton to perforate the well under these extreme conditions without exceeding the pressure limitations of other downhole tools.

With the success of this job, the operator and Halliburton each surpassed individual perforating records – this was the operator's deepest TVD well perforated [the previous record was at 18,039 feet (5498 meters) TVD], and Halliburton achieved the deepest perforated well with an EFS [the previous record was at 27,748 feet (8458 meters) TVD].

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