World’s first acoustic firing head system allows safer and more flexible TCP operations

Location: United Kingdom

Overview
An operator approached Halliburton about an appraisal drillstem test project to be carried out in the harsh West of Shetland environment that required a way to fire two zones independently within the same drillstem (DST) run. However, due to design and operational constraints, traditional mechanical options for multizone firing (ball/bar drop) were not feasible. Several teams within Halliburton collaborated with Metrol to produce a firing head capable of being acoustically initiated. The tool was successfully run and resulted in seamless job performance. This new tool paves the way for future innovation for acoustically initiated firing systems without the need of applying pressure or mechanical intervention to initiate the firing sequence. This has the potential to save rig time and improve safety.

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<td>The operator needed a way to fire two zones independently within the same DST run without applied pressure or mechanical intervention.</td>
<td>Close collaboration between Halliburton, the operator, and Metrol led to the development of a firing head that could be acoustically initiated.</td>
<td>The gun string was successfully initiated acoustically and resulted in seamless job performance.</td>
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<td>Zero pressure or mechanical intervention required to initiate the gun system.</td>
<td>The new acoustically initiated firing head requires no pressure nor mechanical intervention to operate, although minimum hydrostatic pressure is required to work successfully.</td>
<td>By using acoustic telemetry instead of pressure to initiate, operations are safer and can potentially save time in the future if entire firing systems utilize this technique.</td>
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The first ever acoustically initiated tubing-conveyed perforating firing head
Project required a firing head capable of firing zones independently without pressure or mechanical intervention

An operator approached Halliburton about providing a firing system that allowed a way to fire two zones independently within the same DST run. However, due to design and operational constraints, traditional mechanical options for multizone firing (ball/bar drop) were not feasible. Additionally, due to the inclusion of DST tooling, there were limiting pressure factors on this well.

Close collaboration results in exciting new technology

Close collaboration between the Halliburton UK team, Metrol, and TCP Technology in Alvarado, Texas resulted in the development of a Metrol tool that could acoustically activate a Halliburton firing head. Acoustic technology is a form of wireless telemetry that allows function commands to be delivered downhole to carry out various functions. The resulting tool was a modified Model II-D pressure-assisted mechanical firing head run inside a specially developed ported carrier that was compatible with the connection on Metrol’s acoustic firing head actuator. The firing head is initiated by two distinct commands delivered by wireless telemetry, and this is required within a given time period. The explosive train commences when the impacting rod of the acoustic firing head actuator strikes the Model II-D firing head.

Successful initiation paves way for future innovation

The gun string was successfully initiated by this newly designed acoustic firing head with acoustic pulse. The outcome of the collaboration between both companies resulted in a seamless job performance. The firing head was acoustically activated requiring no pressure operations to initiate, although minimum hydrostatic pressure is required to work successfully. In the future, entire firing systems could be initiated acoustically. This will remove the hazards associated with applied surface pressure, and also prevent any accidental detonation of the guns by inadvertently applying pressure to the well. Additionally, the acoustic firing head system offers safety features compared to traditional firing methods, including software controls and a hydraulic safety time-out. Finally, rig-time savings could be realized if pressure-operated systems aren’t required.