Halliburton helped set bridge plug in high-pressure environment at record depth

Halliburton saved client a day and a half of nonproductive time in plug and abandonment of deepwater well

OVERVIEW
Setting plugs and packers in deepwater wells can be challenging. In many cases, the depth and pressure of these wells prohibit the use of explosive setting tools, the more common method. And setting drill pipe can take up to two days, costing a company time and money. An operator in the Gulf of Mexico needed a more efficient and cost-effective method of setting bridge plugs during the plug and abandonment of one of its deepwater wells.

Halliburton recommended its Downhole Power Unit (DPU®-I) tool. The DPU-I tool provides reliable setting of wellbore devices in high-pressure environments. The tool is deployed on wireline, making it more efficient than drill pipe. Halliburton successfully set the bridge plug at a record depth of 31,795 feet in just nine hours, saving the operator a day and a half of nonproductive time (NPT) and approximately $1.5 million USD.

CHALLENGE | SOLUTION
--- | ---
High setting force needed in deepwater well | DPU-I tool rated higher than any other tool
The setting force needed to set the bridge plug was between 70,000 and 90,000 lbf. downhole. Explosive setting tools are only rated with a mechanical shear force of 55,000 lbf. and were not an option in this well. | The DPU-I tool has a setting force rated of 100,000 lbf., almost double the setting force of conventional explosive setting tools. The tool easily handled the force needed to set the bridge plug at a record depth of 31,795 feet.

HP/HT conditions in deepwater well | DPU-I tool designed for HP/HT
The depth needed to set the bridge plug was 31,795 feet. The pressure at this depth reached 25,600 psi and temperatures exceeded 350°F. Explosive setting tools are not rated to work at those pressures and temperatures. | Halliburton designed the DPU-I tool to operate at high temperatures and high pressures. By default, the DPU-I tool is rated to 30,000 psi and 400°F.

Drill pipe more expensive and time-consuming | DPU-I tool deployed with wireline
The only alternative to explosive setting tools before the DPU-I tool was to use drill pipe. However, setting plugs with drill pipe takes two days to run in and out of the hole, wasting drilling time and costing companies millions of dollars per day. | The DPU-I tool can be deployed on wireline, slickline or coiled tubing. Halliburton set the bridge plug in just nine hours using wireline, saving the company a day and a half of NPT and $1.5 million dollars USD.
The DPU®-I tool uses a slow setting mechanical force to set plugs and packers. Traditional explosive setting tools are not as effective in deep-pressure environments as they set too fast with less force. The DPU-I tool is also safer than explosive setting tools.

At 100,000 lbf., the DPU-I tool offers more setting force than conventional explosive setting tools without the added danger of using explosives.

The DPU-I tool easily set the bridge plug at a record depth of 31,795 feet.

**NEW DOWNHOLE RECORD FOR DPU-I TOOL**

31,795 FEET

**MECHANICAL ALTERNATIVE TO EXPLOSIVE SETTING TOOLS**

**setting force of 100,000 LBF**

At 100,000 lbf., the DPU-I tool offers more setting force than conventional explosive setting tools without the added danger of using explosives.

**DPU-I = 9 HRS**

**DRILL PIPE = 48 HRS**

The DPU-I tool, deployed on wireline, set the bridge plug in just nine hours. This saved the operator a potential two-day drill pipe run or about $1.5 million dollars USD.
Operator needed bridge plug in deepwater well

An operator in the Gulf of Mexico needed to set a bridge plug for the plug and abandonment of a deepwater well. Halliburton recommended mechanically setting the bridge plug with its Downhole Power Unit (DPU®-I) tool. The DPU-I tool provides unsurpassed reliability and quality assurance in setting wellbore devices like packers and plugs. The DPU-I tool is a rig-safe, non-explosive device that is safer than the use of explosive setting tools and saves operators the time and expense of using drill pipe.

DPU-I tool surpassed setting forces and pressure ratings of explosives

Explosive setting tools are commonly used to set plugs and packers, but the setting force needed to set this bridge plug was between 70,000 and 90,000 lbf. Explosive setting tools are not designed to generate that kind of force. The maximum setting force for explosive tools in most cases is 55,000 lbf. The high pressures and temperatures of this well also prohibited the use of explosives. Pressures reached 25,600 psi at the depth needed to set the bridge plug and temperatures exceeded 350°F. Explosive setting tools are not rated to work at those pressures and temperatures.

The DPU-I tool’s design makes it ideal for deepwater wells. It offers more setting force over explosive setting tools, with a rating of 100,000 pounds of force. It also is rated to withstand bottomhole pressures of 30,000 psi and 400°F. The hardware and electronics of the tool can withstand high impact loads encountered during this application.

DPU-I tool safer and more efficient than explosive setting tools

The DPU-I tool is also safer than explosive setting tools. There is no risk of an accidental discharge at the surface. Explosive setting tools must be safely transported, stored and disposed of after use, but the DPU-I tool is mechanical, eliminating those requirements. Additionally, the DPU-I tool does not require the disruption of rig operations such as radio transmission, the cathodic protection system, and the drilling of offset wells.
Halliburton saved client a day and a half of nonproductive time in plug and abandonment of deepwater well

**Drill pipe costly and time-consuming**
The only other alternative available to the operator was the use of drill pipe. Drill pipe can be used to mechanically set plugs and can provide the setting force to seal the plug at those depths. However, using drill pipe can take two days and is a more expensive option. The DPU®-I tool can be deployed on wireline, slickline, or coiled tubing, making it faster to deploy than drill pipe and saving NPT. The DPU-I tool operates with telemetry, allowing real-time feedback of setting force, stroke length and displacement rate, ensuring the tool is working.

**DPU-I tool helped set plug at record depth in less than a day**
Halliburton deployed the DPU-I tool with wireline to set the bridge plug for this deepwater well at a record depth of 31,795 feet. The entire operation took nine hours to complete without any NPT during the setting of the plug. The slow, controlled application of force enabled the sealing elements and anchoring devices to conform to the wellbore. Real-time monitoring allowed the crew to view the setting force, stroke length and displacement rate as it happened. The speed of the operation saved the operator more than a day and a half of rig time, or about $1.5 million dollars USD.

The operator was impressed with the precision and speed with which Halliburton conducted the operation. The safety of the operation and the cost savings also benefited the operator. The DPU-I tool is the first electro-mechanical setting tool in the industry and this record-breaking performance in deep water proved that it is still the best in the industry.