

**Case study:** Indonesia

# Longest thru-tubing, inflatable bridge plug BHA conveyed by e-line isolates zone, eliminate re-completion cost

An onshore well in a remote, underdeveloped region of Indonesia experienced declining production. The operator attempted to increase production flow by perforating an interval below the original perforation zones. However, the additional perforation zone resulted in even lower production rates.

Several attempts to open the perforations and resume production by rocking the well proved unsuccessful. The operator suspected that the production loss was caused by an increase of a water column from the newly perforated zone and crossflow to adjacent intervals.

The operator wanted to boost production rates by performing a workover to isolate the new perforation interval. But given the well's remote location, transporting tools to pull the completion string would add significant time and costs to the intervention operation.

## **Isolating the zone with a reliable, retrievable plug**

The operator asked Baker Hughes to supply, deploy, and set a 3-in. inflatable retrievable bridge plug (IRBP) inside 7-in. casing at the lowermost perforation interval. If the production problem persisted, a second IRBP would be set above the first plug to completely isolate the lower zone and produce from the original, upper two zones only.

The operator selected the IRBP deployment to avoid the high costs of pulling the completion. And unlike a permanent plug, the IRBP provided the flexibility to retrieve the plug later if desired. The operator selected Baker Hughes based on positive engagement in previous projects as well as the service provider's ability to provide a reliable, cost-effective solution on short notice.

## **Collaborating on an efficient solution**

Careful planning was essential to success, as the two IRBPs would be deployed through tubing as part of the longest bottomhole assembly (BHA) ever run downhole by the operator. As a result, the two companies collaborated to develop a safe and efficient lifting plan that would avoid damage to the BHA.

In another first, this project would mark the largest IRBP string ever run and set using electric wireline (e-line) and the AutoBot software. AutoBot allows for manual or automated control of the DC power supply connected to the IRBP's setting tool. In automated mode, the software automates the voltage required at the setting tool, thus reducing the risks of failure and human error while setting the plug.

The limited space between the top of one perforation zone and the bottom of the next (roughly 5 m) presented additional setting challenges. The companies took detailed dimensional measurements of the IRBPs to ensure successful setting.

## **Challenges**

- New perforation in mature well
- Well's remote location added significant time and cost to conventional intervention job
- Deploying and setting retrievable bridge plugs on longest BHA to date introduced deployment risks and potential damage to the plugs

## **Results**

- Successfully set two consecutive 3-in. IRBPs inside 7-in. liner using e-line
- Reduced the risk and cost of setting failures in the longest BHA deployment via e-line
- Reliably set both IRBPs using AutoBot in less than one hour
- Eliminated the need to pull the completion string, saving re-completion cost.

## Achieving effective zonal isolation according to plan

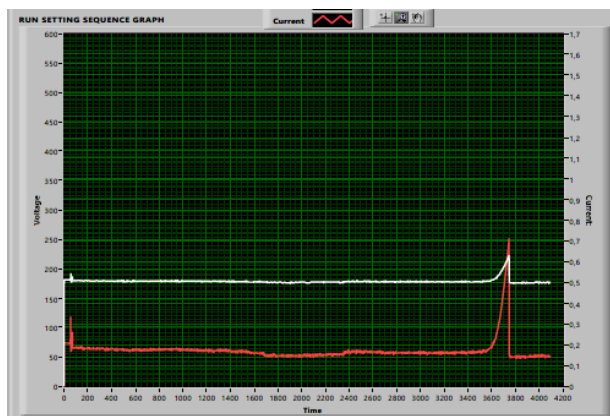
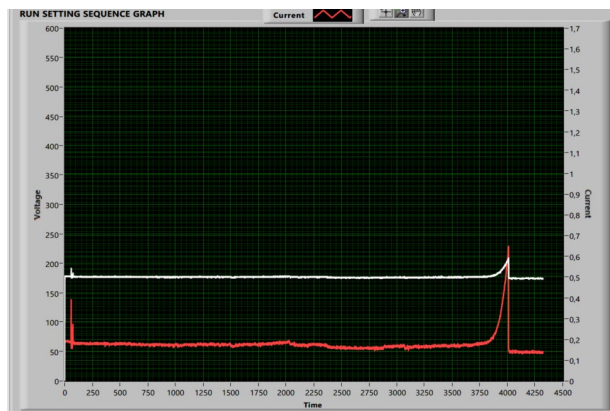
Careful planning and close collaboration ensured a flawless setting operation. The first 3-in. IRBP passed through a restriction with a minimum ID of 3.725 in. and set successfully inside the 7-in. casing to isolate the lowermost zone. When production flow did not improve after 24 hours, the operator set the second IRBP to fully isolate the lowermost zone and optimize production from the upper zones.

As the pressures and production rates decline from the upper zones, the operator maintains the option to retrieve the second IRBP to resume production from the lower zone.

Both IRBPs were successfully deployed via e-line in the operator's longest BHA to date. The AutoBot software set both IRBP's within a 5-m interval of each perforation zone in just one hour.

Deploying and automatically setting two IRBPs on the longest BHA to date proved to be a reliable and cost-effective well-intervention solution. The operator avoided pulling the completion string prior to isolating the lowermost perforated zone, saving an estimated \$700K USD in rig time and tool costs.

The operator attributed the success of this operation to several factors, including proper technology selection and tool availability, excellent warehouse preparation, technical expertise of the field crew, and clear communication with the Baker Hughes Indonesia Service Delivery Team.



A graphical layout of the setting sequence for the first IRBP using the AutoBot plotter program.