



## CASE STUDY

# Deep Set Bypass Plug (DSBP) eliminates 8000 barrels of brine losses to the formation

## Product

### Deep Set Bypass Glass Plug (DSBP)

## Outline

In one of the biggest offshore oilfields in the world, the operator was facing a challenge of severe completion fluid losses to the formation after spotting the filter cake breaker fluid during the lower completion stage.

In order to assist the operator with eliminating fluid losses to the formation, TCO developed the Deep Set Bypass Plug (DSBP) which is a remotely actuated barrier glass plug with bypass capability. The DSBP allows auto-filling during run in hole as well as fluid circulation to displace the wellbore. Once the bypass is closed remotely, a V0 validated barrier is established to prevent losses to the formation and allow for the safe deployment of the Upper Completion by isolating the reservoir.

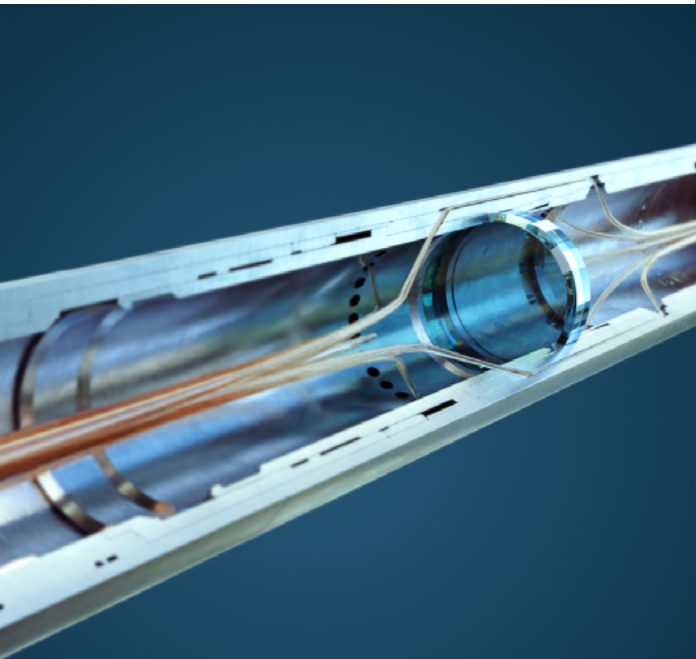
On May 23, 2024, TCO successfully deployed and opened the DSBP, which resulted in the elimination of fluid losses and, in turn, significant cost savings for the operator.

## Challenge

During the Completion stage of one of the biggest offshore oilfields in the world, the operator was losing an average of 8000 bbls of inhibited filtered brine to the formation per well. The losses started after spotting the filter cake breaker fluid during the lower completion installation.

Historically, in different projects around the world, this problem was tackled using technologies such as lost circulation materials (LCMs) or ball/flapper type formation isolation valves. Both technologies have their disadvantages. LCMs can cause formation damage, increase costs due to material expenses, require significant time for mixing and pumping, and may necessitate multiple treatments. Ball/flapper valves can lead to a reduced completion string ID as they do not provide full bore access after opening. Additionally, the ball/flapper is traditionally manufactured using nickel alloy material that is extremely hard to mill in the event of a failure to remotely open the valves.

In this case, the operator tried to reduce the losses by switching to a lighter fluid while deploying the upper completion until the well was isolated by the production packer.





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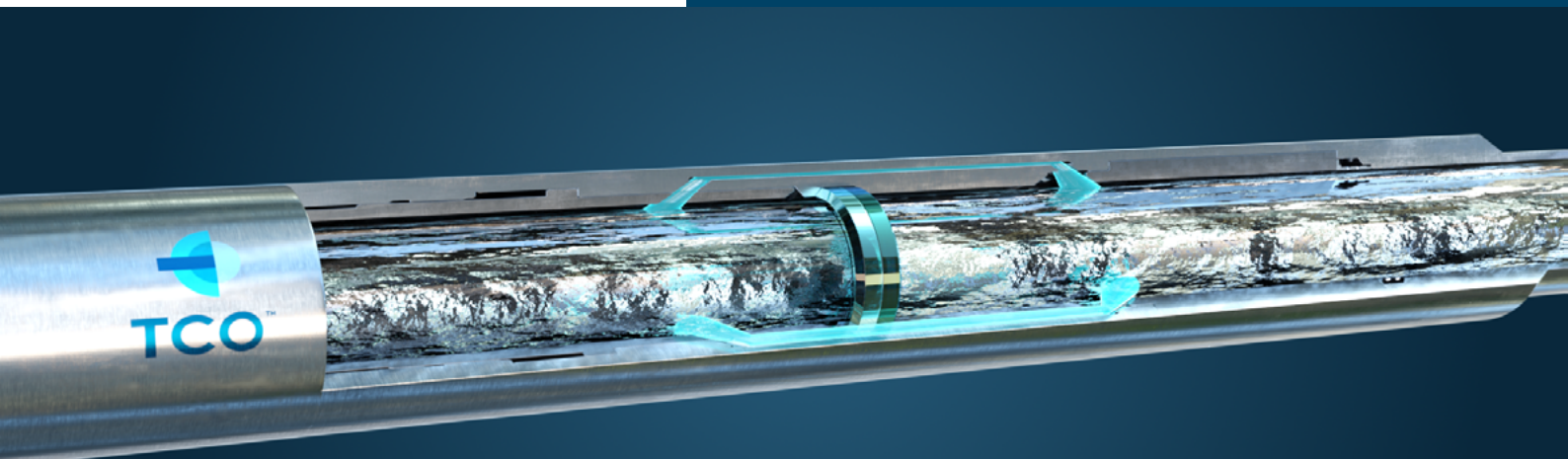
### Deep Set Bypass Glass Plug (DSBP)

## Solution

To completely eliminate fluid losses during the completion stage, the lower completion must be isolated after spotting the filter cake breaker fluid.

A project was initiated by TCO to develop a Barrier Glass Plug that could be installed in the lower completion. In order to utilize a barrier glass plug in the lower completion for the purpose of fluid loss prevention; multiple design criteria had to be met. The plug had to allow pumping past the barrier glass disc to facilitate the displacement of the wellbore and the placement of the filter cake breaker. After the pumping operation, the sleeve needs to be closed remotely to eliminate the expected losses after the placement of the filter cake breaker. After closure of the sleeve, the glass disc must be ISO 14998 V0 rated to act as a wellbore barrier. In addition, the plug is required to open remotely using pressure cycles. To develop the DSBP, multiple technologies from existing plugs with proven track records were incorporated. The DSBP consists of the following main components:

1. V0-Qualified Glass Disc.
2. Bypass Sleeve to allow fluid flow of up to 10 bbls/min around the Glass Disc.
3. E-trigger to close the bypass sleeve remotely by performing a unique pre-programmed pressure key.
4. Balanced Multi-cycle Counter to open the Plug remotely by applying pressure cycles.
5. Communication Bellows to protect the Balanced Multi-cycle Counter by isolating it from wellbore fluids.





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### Result

The DSBP was developed to provide a solution for the operator with regards to the severe losses during the completion phase. The DSBP replaces adverse technologies like LCMs and ball/flapper type formation isolation valves that are more costly, can lead to formation damage, reduce the completion ID, and increase operational risk.

Proven technologies like the E-trigger and the Balanced Mechanical Counter were incorporated to allow for remote closure of the sleeve and remote actuation of the plug. Additionally, the DSBP underwent a stringent testing program to highest industry standards to confirm the functionality and robustness of the plug. The DSBP is ISO 14998 V0 rated to 6500 psi and 302 degF and is qualified up to 10 bbls/min flow rate.

The main objective of the operator was achieved by utilizing the DSBP to eliminate fluid loss to the formation. The result was the elimination of 8000 bbls of inhibited filtered brine losses to the formation, leading to significant cost savings for the operator. In addition, isolating the reservoir during the deployment of the Upper Completion resulted in enhancing the wellbore safety during the operation.



### Highlights

- Eliminated fluid losses to the Formation, resulting in significant cost savings.
- Severe stress reduction to formation by using the E-trigger and closing the bypass in pressure equilibrium
- Enhanced well safety by isolating the reservoir with a V0 rated barrier during Upper Completion deployment.
- Allowed for a flexible and fail-safe unique sleeve closure pressure key using the E-trigger.
- Reduced operational risks due to the debris tolerant activation system.