

RestrictionVA

QUANTIFYING RESTRICTIONS IN AN EXTREME REACH LATERAL

EV's Integrated Video Caliper (IVC) tool incorporates qualitative & quantitative measurements to identify the root cause of restricted wellbore access.

EXTREME REACH LATERALS

An industry-wide drive for efficiency has resulted in enhanced well design of unconventional wells. Extreme-reach laterals enable operators to produce more hydrocarbons from fewer wells, but this increase in horizontal length brings with it a number of challenges.

HOLD-UP DETECTED

A multistage frac operation in an extreme lateral of 23,000ft, stopped to a halt when the operator experienced an unknown obstruction at approximately 18,200ft in the production casing while pumping down their plug and perforating gun assembly for the second stage. With live guns on site and the operation on standby, the operator needed a clear understanding of the restriction and how to overcome it.

EV's 24 arm Integrated Video Caliper was deployed on an E-Line tractor providing high definition video, combined with multi-finger caliper measurements, to help identify the causes of the hold up. EV's Video-while-tractoring technology provides live video while tractoring, enabling real-time decision making and risk reduction during interventions in extreme reach laterals.

The caliper identified a number of anomalous casing collars that have smaller ID's than the expected drift ID of 3.795 inches.

⚠ THE CHALLENGE

A multistage frac in an extreme reach lateral stopped to a halt when the operator experienced an unknown obstruction in the production casing, while pumping down their plug and perforating gun assembly for the second stage. With live guns on site, and the operation on standby, the operator needed a clear understanding of the restriction and how to overcome it.

💡 THE SOLUTION

EV's Optis[®] IVC-24 tool was deployed on an e-line tractor to help identify the causes of the hold-up. EV's Video-while-tractoring technology provides live video while tractoring, enabling real-time decision making and risk reduction during interventions in extreme reach laterals.

✅ THE RESULTS

The first anomalous casing collar, located at 20,000 ft (**Fig.1**), shows signs of ovalization as confirmed in the video footage. A further three casing collars experienced the same issue. The anomalous collar at 18,400 ft, the closest anomaly to the suspected hold up depth, had a minimum ID of 3.460 inches (**Fig.2**), which is smaller than the dimensions of the original plug & perforating assembly. With the quantitative information provided by RestrictionVA, the operator was able to run a modified plug and perf assembly to pass through the restriction and complete the well onto production. The connection anomalies were diagnosed to be caused by 'over-torque' during make up, leading to changes in procedure for future wells to prevent reoccurrence.

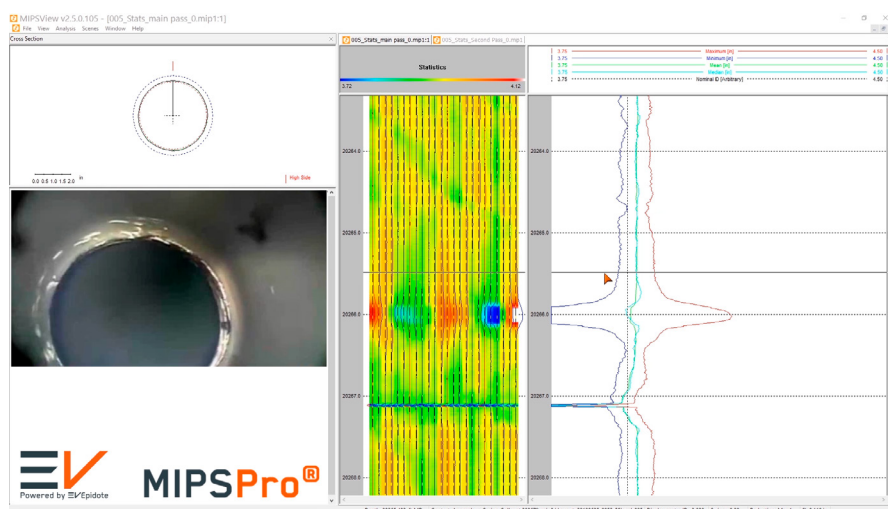


Figure 1: Anomalous casing collar identified at 20,000 ft

QUANTIFYING THE SEVERITY

The first anomalous casing collar, located at 20,000 ft, shows signs of ovalization as confirmed in the video footage (**Fig. 1**). A further three casing collars were identified to have the same issue.

The anomalous collar at 18,400 feet, the closest anomaly to the suspected hold up depth, had a minimum ID of 3.460 inches (**Fig. 2**), which is smaller than the dimensions of the original plug and perforating assembly. The 3D model helps illustrate the extent of the restriction (**Fig. 3**).

The most severe anomaly detected by the caliper was identified at 14,600 feet, with an ID of less than 2.6 inches. However, on closer inspection of the video footage this was found to be loose debris and not a deformed casing collar (**Fig. 4**).

From this information, the operator was able to dismiss the anomaly, saving an unnecessary milling operation if mis-diagnosed as another deformed casing collar, highlighting the value of the Integrated Video Caliper service.

DELIVERING THE WELL ONTO PRODUCTION

With the quantitative information provided by RestrictionVA, the operator was able to run a modified plug and perf assembly to pass through the restriction and complete the well onto production.

The connection anomalies were diagnosed to be caused by 'over-torque' during make up, leading to changes in procedure for future wells to prevent reoccurrence.

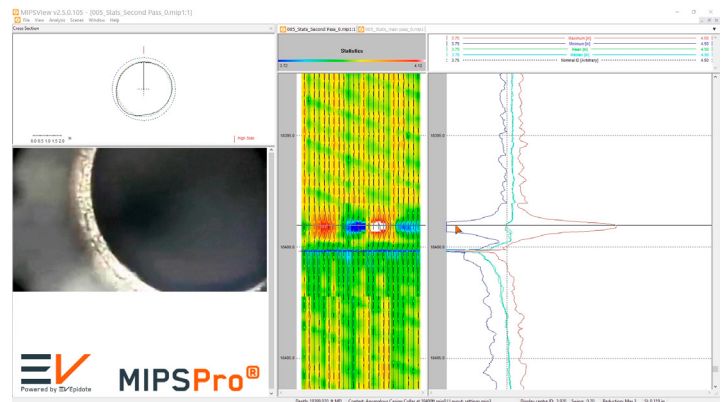


Figure 2: Anomalous casing collar identified at 18,400 ft

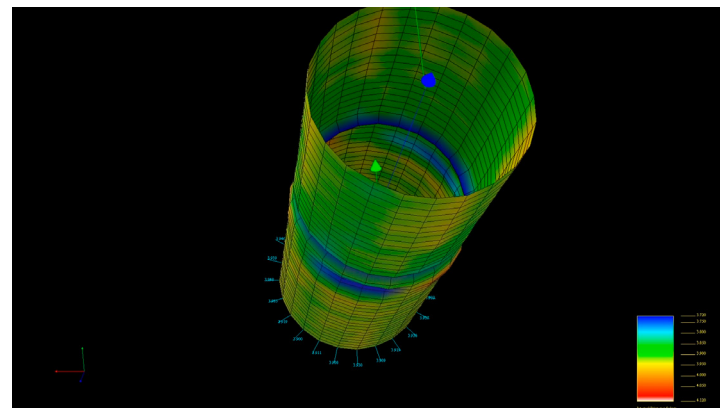


Figure 3: 3D Model of the casing collar

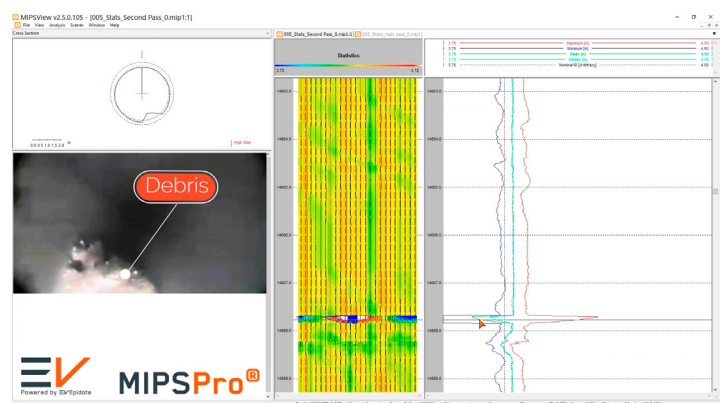


Figure 4: Footage of debris and caliper response at 14,600 ft