



Project Scope: Optimizing coiled tubing life

Location: Kindersley, Sask.

String Size: 73mm (2-7/8") mono wall

Total Measured Depth: All wells approximately 1,500m (4,920ft)

Date: July –December 2014

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CHALLENGE:

One of Western Canada's largest conventional oil and natural gas producers was experiencing rapid erosion of its 73mm (2-7/8") coiled tubing (CT) when used in CT conveyed, nitrified fracs during completion operations in southern Saskatchewan. The abrasive nature of the energized frac slurry pumped through the CT caused accelerated, uneven wear on the string's internal diameter. The client was averaging only eight to 12 jobs per string with its incumbent CT service provider. Eager to prolong the life of their CT strings, improve operations, and reduce overall project costs, the client turned to STEP's professionals to provide a solution.

EXECUTION:

STEP's technical specialists conducted a thorough analysis and developed a plan to run a custom-designed 73mm (2-7/8") string with a 0.250" wall, coupled with an in-depth monitoring and string management program.

STEP noticed that the coiled tubing (CT) located at the core of the reel had a higher wear rate than what is encountered at the tail end. By reversing the string after 26 jobs, STEP was able to get an additional 14 jobs out of the string and take advantage of the wall thickness still present at the whip end.

The 0.25" heavy wall coil, along with the monitoring and reversal program, allowed the string to service a total of 40 wells before retirement. This heavy wall CT regiment allowed for three times the number of frac jobs a standard 73 mm (2-7/8") string would typically accomplish, representing a 300% increase in utilization.

To accomplish this management strategy, CT wall thickness is measured before each job to track wear from well to well. As data is collected and processed, it creates a valuable CT profile that can be leveraged for future plans. This CT profile allowed STEP's team to pinpoint the optimal time for reversal while working with the client to meet their operational timeline. The monitoring process also provided an instantaneous snapshot of the string's status as soon as STEP's field professionals entered their data. This becomes a beneficial tool for the on-site client representative and depicts an accurate representation of the CT's real-time condition.



THE STEP WAY:

With this string management program, STEP provided a number of cost/time saving solutions:

1. DIRECT COST SAVINGS

- STEP's recommendation proved to be very valuable, tripling the amount of jobs performed out of one string. This meant less money spent on replacing retired strings.

Coiled Tubing Size	No of Jobs Performed with One String	No. of Strings Required
73 mm (2-7/8") with 0.190" wall	12	3
73mm (2-7/8") with 0.250" wall	40	1

*Cost is an estimate only and includes CT cost, trucking from CT plant in USA, CT spooling onto reel, trucking to client site, third party costs, crane, plus one working day.

By applying the 3:1 ratio, the client **saved approximately 20 per cent** on coiled tubing.

2. INCREASED EFFICIENCIES

- Greater utilization of the client's CT meant STEP professionals were able to spend more time in the field and less time re-spooling new string and waiting for third party services. This resulted in less lag time between jobs.
- As data was collected and processed, it created a valuable CT profile that could be leveraged to plan ahead for scheduling string reversal (at the most optimal point in the string's life and the most suitable time in the frac schedule).
- Close CT monitoring also allowed for more efficient procurement planning and logistics (CT fabrication and delivery from the USA)
- The monitoring process provided an instantaneous snapshot of the string's status. This is now a beneficial tool for operations and provides an accurate representation of the CT's real-time condition.
- Improved monitoring/data collection times and methodologies provided valuable learning tools that the client can use for future well programs.

3. INCREASED SAFETY

- STEP's wall thickness monitoring program increases safety by providing professionals with accurate data on critical erosion points on the string. Dangerous and costly string failures on location were eliminated from ongoing operations.

With a proven and optimized monitoring regiment for CT strings, STEP has the ability to provide an accurate coil monitoring service to help clients maximize fracturing programs and minimize costs.