

Tension, compression, and torque sensor unit

Enhance control with real-time downhole data

As part of TeleCoil™ intelligent coiled tubing services, the tension, compression, and torque (TCT) sensor unit provides feedback reflecting the forces being exerted on the bottomhole assembly (BHA). Monitoring torque, compression, tension, temperature, pressure, and depth correlation data enables coiled tubing crew to make better decisions during operations, enhancing performance and increasing operational certainty.

Live data is fed to the surface through a vibration-resistant wire shrouded in a rugged protective sheath that stands up to the harshest downhole environments, offering superior monitoring and feedback, even in extreme, high-vibration conditions. CIRCA™ REAL TIME (RT) modelling software incorporates live operational data to update job models on the fly, helping improve and enhance coiled tubing operations while on the rig site.

Optimize milling

Using downhole data to direct milling operations can save time and reduce the risk of tool failure. Torque readings from the TCT sensory unit help coiled tubing crew optimize weight on bit (WOB) to prolong mill and motor

life. Torque can also be used to spot variances in milled materials, helping personnel differentiate between plugs, stumps, washing sand, and other possible wellbore obstructions. As well, motors can be monitored over time, providing performance indicators that can signal power drop off and the approaching end of motor life.

Reduce fishing time

The ability to measure WOB in real time reduces uncertainty and missed runs. It can be used to confirm that the BHA is latched to a fish, and to verify that a downhole jar has been successfully activated. And when the fish breaks free, its added weight can be confirmed, letting surface personnel know that it has been caught and is free for extraction.

Enhance extended reach Capabilities

Coiled tubing is limited by mechanical friction in how far it can travel in an extended lateral. Metal-to-metal friction between the coiled tubing and the casing wall will eventually build to levels that stop forward progress. Advanced friction reducers like the EasyReach™ lubricant can reduce the

Applications

- Vertical and deviated wells
- Extended reach wellbores
- Milling and cutting
- Fishing
- Solids removal
- Actuation of sleeves
- Setting packers and casing patches

Benefits

- Live downhole torque readings
 - Help identify obstructions while milling (plugs, stumps, sand, and so on)
 - Aid in determining and maintaining WOB to optimize milling
 - Track motor performance over time
 - Extend motor and mill life
- Real-time compression and tension measurements
 - Help diagnose and differentiate between friction lockup and wellbore obstructions
 - Optimize lubricant placement and usage, and monitor progress of extended reach tools
 - Enable control of WOB to accurately set inflatable packers, straddles, and casing patches
 - Confirm jarring activation and effective fish capture

coefficient of friction by as much as 60% in downhole conditions. Fluid hammer tools and tractors can also be used to increase reach.

Having real-time TCT feedback can help coiled tubing control personnel better understand how well a specific extended reach tool is working, and can optimize lubricant effectiveness. The result is an ability to reach total depth in long laterals in less time with more certainty.

Improve efficiency in cleanouts

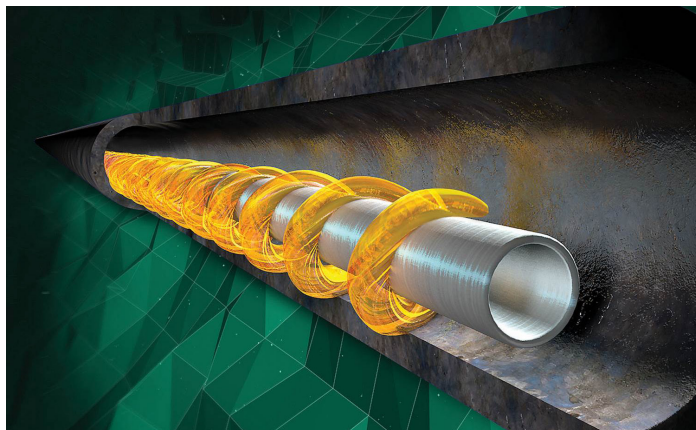
Cleanouts can be a challenge, particularly in highly deviated wells. With live torque and compression data, coiled tubing control personnel can more effectively identify top of sand in deviated wellbores, helping them execute sand removal more reliably. They can also more easily differentiate between friction lockup and wellbore obstructions, reducing operational time and reducing the risk of stuck pipe.

Confidently manipulate downhole hardware

Having live compression and tension data that does not rely on calculations greatly increases certainty in coiled tubing applications involving the mechanical manipulation of downhole tools or equipment. Coiled tubing personnel can easily apply the specific WOB required for inflatable devices. They can also pull back to ensure WOB is neutral when setting casing patches.

Technical Data

TCT sensor unit specifications					
Dimensions & ratings	Size 2.125-in.	Size 2.875-in.	Sensor capabilities OD	Size 2.125-in.	Size 2.875-in.
OD	2.125-in.	2.875-in.	Axial load range	-3,500 to 30,000 lbf	-10,000 to 56,000 lbf
Make-up length	10 ft (3 m)	6.26 ft (1.9 m)	Axial load resolution	< 5%	< 5%
Max. external pressure	10,000 psi (689 bar)	9,000 psi (620.5 bar)	Axial measurement error	< 20 lbf	< 20 lbf
Max. temperature	300°F (149°C)	300°F (149°C)	Torque range	375 ft-lbf	1,500 ft-lbf
Max. differential pressure	5,000 psi (345 bar)	5,000 psi (345 bar)	Torque resolution	+/- 1 ft-lbf	< 20 ft-lbf
Max. flow rate	To 5,000 psi burst	8 BPM	Torque error margin	< 5%	< 2%



EasyReach lubricant can reduce the coefficient of friction by as much as 60% in downhole conditions, helping extend the reach of coiled tubing in long wellbores.



CIRCA and CIRCA RT modeling software is used to design coiled tubing jobs and make on-site adjustments as conditions change, helping increase certainty and operational efficiency.

