

Directive™ - Tensor MWD in the Tarim Field - Case Study

Recognized as the leading provider of predictable and reliable MWD performance in high temperature [HT], 175 °C/ 347 °F environments, Tensor Drilling Technologies was invited to develop and deploy a highly ruggedized system to survive the extreme temperature of the Tarim Basin.

In the southern part of the Xinjiang Uygur Autonomous Region, Tarim Oil and Gas Province is located in the Tarim Basin, China's largest oil and gas-bearing basin. The basin entraps oil and gas resources of both marine and continental facies, which are difficult to tap due to large burial depth (3200-6500 m), high formation pressure (34-65 MPa for oilfields, and 32-128 MPa for gas fields) and high temperature (140+ °C).

After suffering multiple failures of competing MWD tools from a major US equipment provider, Tensor Drilling Technologies was invited by Xi an HYRT Petroleum Services Co. Ltd to deploy a system that could successfully complete the wells in the Tarim field.

Coupling Tensor's proven success in extreme environments with market leading solutions to counter the expected high temperature, Tensor Drilling Technologies provided a system capable of delivering in a field where competition had failed.

Over 8 runs and cumulative of over 1000 hours the Tensor 175 °C Directional Modules proved resistance to the extreme temperature and delivered the well to TD to the satisfaction of the customer with zero failures.

The Tensor 175 °C Directional Module - Directive™ surpasses all existing HT tools in its class and enables operators and service companies to drill with greater confidence through less frequent bit trips and lower cost of operations.

Directive Directional Module

The Directive technology suite has redefined expectations for accuracy and reliability of Directional Modules. The market leading electronics, designed and manufactured by Tensor Drilling Technologies, dramatically improves Tensor MWD performance.

Users benefit from improved reliability and preventive diagnostics significantly reducing total cost of ownership. TENSOR is the proven and most cost- effective probe MWD platform for High-Temperature, High-Pressure [HTHP] applications - while reducing NPT and increasing mean time between failure [MTBF].

Proven Reliability

System development included HALT testing over a temperature range of -60 - 220 °C/ -76 - 428 °F under vibration levels up to 80 g RMS.

Rigorously verified with more than 10,000 field test hours of benchmarking at temperatures up to and beyond 175 °C, more than 1,000 hours drilling and more than 50,000 feet drilled in various formations in North America with both EM and mud pulse telemetry.



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175 °C Directional Module Operations in the Tarim Field

Well	Operator	Client	Run Parameters				
			Depth Interval (m)	Maximum Temperature (°C)		No. of Runs	Duration (hrs.)
				Circulating	Static		
SHB4-5H	Sinopec Northwest	HYRT	7573-7730	129	148	1	136
Shunber 47X	Sinopec Northwest	HYRT	7533-8438	141	158	6	774.5
ManS3-H5	Chuanqing Drilling	HYRT	8325-8410	145	164	1	133

Specifications

Directional Sensor Specifications			Environmental Specifications	
Measurement	Range	Accuracy	Dynamic Specifications	
Inclination	0 - 180°	+/- 0.1°	Vibration	20 g RMS
Azimuth	0 - 360°	+/- 0.25°	Real Time Update	1,000 g / 0.5 ms 1/2 sine all axes
Toolface - Magnetic	0 - 360°	+/- 0.5°	Temperature Specifications	
Toolface - Gravity	0 - 360°	+/- 0.5°	Operating Temperature	-25 °C to +175 °C
TMF	0 - 100 µT	+/- 0.075 µT	Maximum Thermal Gradient	3 °C per minute
GT	0 - 2,000 g	+/- 0.001 g		
Temperature	-35 - 200 °C	+/- 0.5 °C		
Peak Shock	0 - 250 g	+/- 1 g		

Customer Testimony

"I would like to address in particular that the performance of Tensor DMs in well ManS3-5H was outstanding. After 11 runs with tripping out due to failures of competing MWD tools, the operator turned to us for providing emergency support. We applied Tensor DMs to complete the last run reaching the target depth with full success. Now the Tensor DMs are being run in ManS3-6H."

Mr. Xingli Wan

Acting General Manager

Xi an HYRT Petroleum Technology Services Co. Ltd.

