

SDI GYRO SURVEY SYSTEM

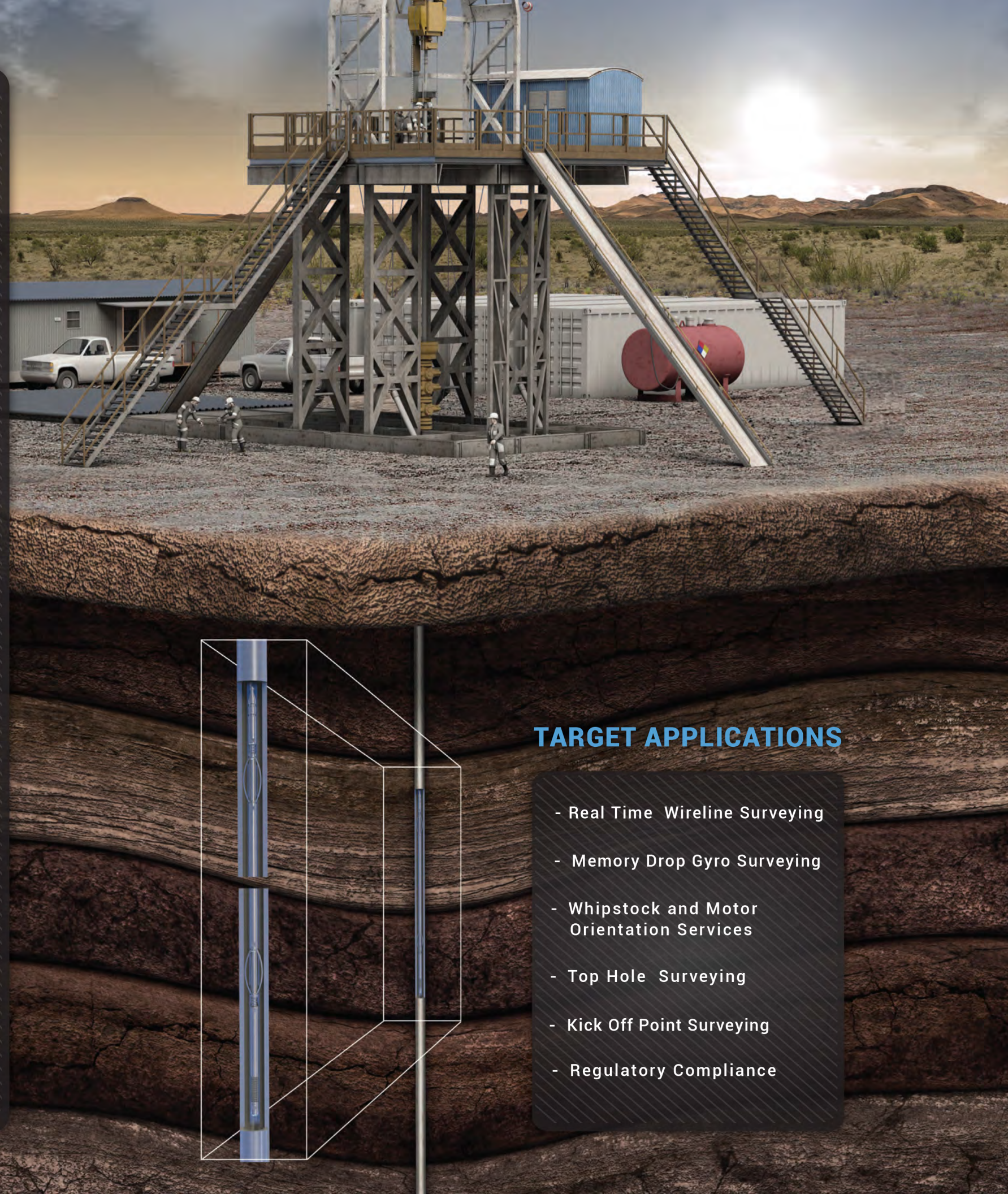
SDI's premier wellbore surveying technology has been streamlined to provide customers with the new EDGE Survey System. EDGE provides a cost effective option for appropriate markets, while maintaining the performance and quality standards customers have come to expect from SDI.

- **Convenient flat rate pricing based on the chosen conveyance method.**
- **The EDGE Survey System reduces survey times allowing you to get back to drilling faster**

Advance quality assurance systems allow for lighting fast survey times reducing rig downtime while surveying using wireline. The memory drop gyro service virtually eliminates rig time requirements. Combining these operational features with a new state of the art software allows for faster surveying saving time and money.

- **The EDGE Survey System meets or exceeds the Operators Wellbore Survey Group (OWSG) error model**

The OWSG is a sub committee of International Steering Committee for Wellbore Survey Accuracy (ISCWSA) made up of wellbore positioning experts from several industry leading exploration and production companies. Working together they developed an Instrument Performance Model (IPM) that meets the specification of multiple service providers. These IPM's are aimed at simplifying the anti-collision analysis for future drilling reducing the risks associated other vendors unproven IPM's.



TARGET APPLICATIONS

- Real Time Wireline Surveying
- Memory Drop Gyro Surveying
- Whipstock and Motor Orientation Services
- Top Hole Surveying
- Kick Off Point Surveying
- Regulatory Compliance

What is a wellbore survey and how does it relate to an EOU?

A wellbore survey consists of measured depth, inclination and azimuth. From these sensor measurements Northing / Easting, Vertical Section, and True Vertical Depth can be calculated.

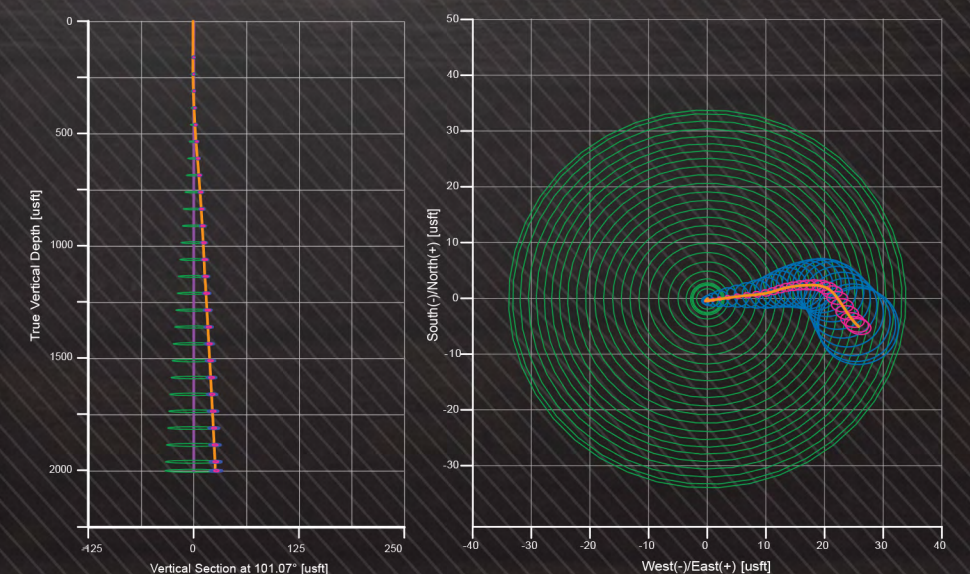
Now that the positional data for a given well has been generated its location is known correct?

The answer is both yes and no. Every survey tool has a related amount of positional uncertainty which should be modeled by a supplier validated Instrument Performance Model (IPM). IPM's use many error model terms in order to calculate a survey's Ellipse of Uncertainty (EOU). Several of these terms are combined to generate a three dimensional ellipse that resembles the shape of an egg. A more accurate survey tool will produce a smaller EOU for a well at a specified depth. For perspective, the EOU produced by a standard MWD tool for a two mile long lateral well landed at 8000' TVD has the same area as a major league baseball field. A premium Keeper gyro survey on that same well provides an uncertainty area the size of half a basketball court!

Depending on a number of factors a premium keeper gyro survey may exceed a given wells technical requirements. Factors worth considering in choosing an appropriate survey tool are offset surface well spacing, hole section to be surveyed, and the targeted formation pay thickness.

Consider the example below which highlights a near vertical surface hole section in the Permian basin to a depth of 2,000'. In this situation you can see how a premium gyro, the SDI Keeper, provides a EOU of less than 2.5 ft cross sectional distance for a well that's open hole diameter is a foot wide. This level of accuracy is not required for this situation due to the surface well spacing 20 ft and a 80 ft thick targeted pay zone. The EDGE (OWSG EOU) would be a more practical choice in this application. Additionally, an inclination only survey tool in this provides you with a lateral uncertainty of over 30 feet, which will cause serious anti collisions concerns for the next well.

Plan and section view Keeper / Edge (OWSG) / Inc Only



SDI GYRO EDGE

GENERAL SPECIFICATIONS

INSTRUMENT ACCURACY	
INCLINATION	0.1° Inc 0° - 30° Inclination
AZIMUTH	0.15° > 3° Inclination
TOOL FACE	0.15° > 3° Inclination
TOOL SPECIFICATIONS	
PRESSURE RATING	20,000 psi [137,900 kPa]
SURVEY SPEED	400 ft/min [Suggested Maximum]
MAXIMUM INCLINATION OPERATION	30°
SURVEYING IN HOLE SIZE RANGING FROM	2 3/8" Tubing up to 13 3/8" Casing
MAXIMUM TEMPERATURE	200° F Unshielded 300° F with Heat Shield
SURVEYING TIME ON WIRELINE	Reduced to 20 mins per 1000ft
BATTERY POWER	Alkaline = 12 hours Lithium = 36 hours
SYSTEM ACCURACY	Subject to Well Profile

ELLIPSE OF UNCERTAINTY

SCIENTIFIC DRILLING'S ISCWSA ERROR MODELS

Well Location: PERMIAN BASIN

Well Profile: Surface Hole Section [2000 ft] Inclination Remains Under 3 Degrees

ERROR MODEL	SEMI MINOR AXIS [FT.]	SEMI MAJOR AXIS [FT.]	ELLIPSE AREA [SQ.FT.]	ACCURACY COMPARED TO THE SDI KEEPER
SDI KEEPER WIRELINE GYRO	2	1.6	10.5	n/a
SDI EDGE (OWSG GYRO)	6.8	6.8	145	13 x less accurate
INCLINATION ONLY	33.9	33.9	3,610	340 x less accurate



Scientific Drilling



CORPORATE HEADQUARTERS

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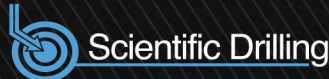
www.scientificdrilling.com



EDGE GYRO SURVEYING SYSTEM



SDI's EDGE SERVICE is designed to provide gyro surveys safely, reliably and effectively in order to meet drilling and regulatory requirements at an exceptional price point.



THE **ULTIMATE PARTNER** IN WELLBORE PLACEMENT

For additional information on SDI's Gyro services such as Live Steering, gyroMWD, and Premium Keeper Surveys please contact your local SDI representative.