

SOME LIKE IT HOT

GEOHERMAL FORUM

May 29, 2025

8:00 am - 6:00 pm

HOST SPONSOR: **NOV**

10353 Richmond Ave., Houston, TX 77042



iadd-intl.org

Compound Angle Motor Stabilization

Improving Drilling Performance by Analysis and Technology Implementation
A Geothermal Case Study

Speaker Information

- Juan Soberanes
- Drilling Optimization Manager / Mechanical Engineer
- 2004. M/LWD, DD, OSC-Perform, SDM, Acc Mgr.



Turbo Drill Industries – Manufacturing/Parent Co.

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Coring Services

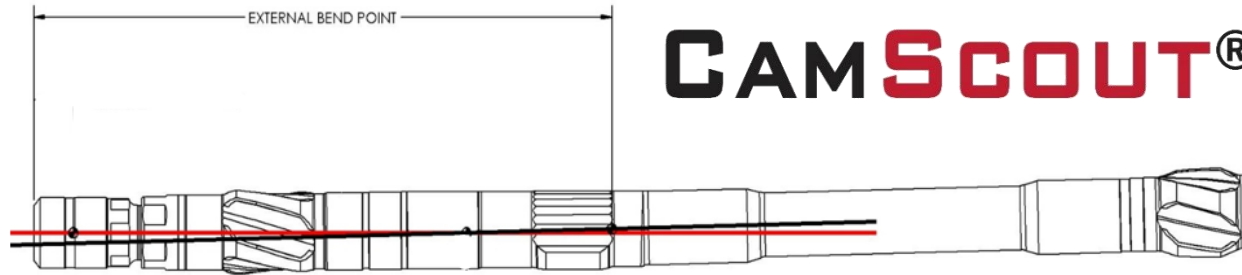
iadd | International Association
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Topics / Agenda

- **Compound Angle Motor (CAM) and Stabilization**
- **General performance comparisons with different Bend and Stabilization**
 - Rotary Trends (Bit, CAM Motor config., BHA design, etc.)
 - Trajectory corrections. “The higher the bend the lower the sliding percentage”
- **Challenges in Geothermal Environment**
 - Drilling Parameters.
 - Implications in BHA Modeling. Higher WOB, Torque, etc.
 - High Compressive strength, abrasive formations
 - Side forces, bending moments, etc.
 - Temperature, Tool Reliability/exposure.

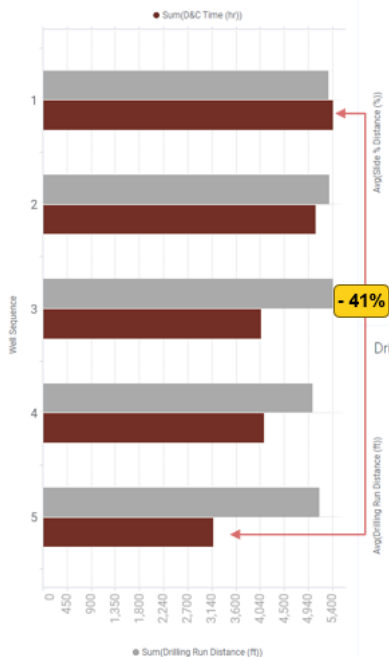
Compound Angle Motor (CAM) and Stabilization

CAM Scout® features an internal tilted mandrel that is timed to a low external bend forming a “Compound Angle” that delivers high dogleg capabilities while slide drilling, and high surface RPM while rotary drilling

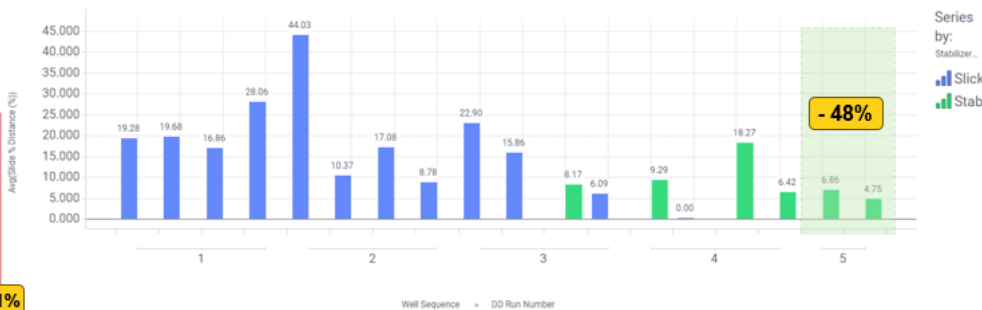


CAM Stabilization and Sliding percentage

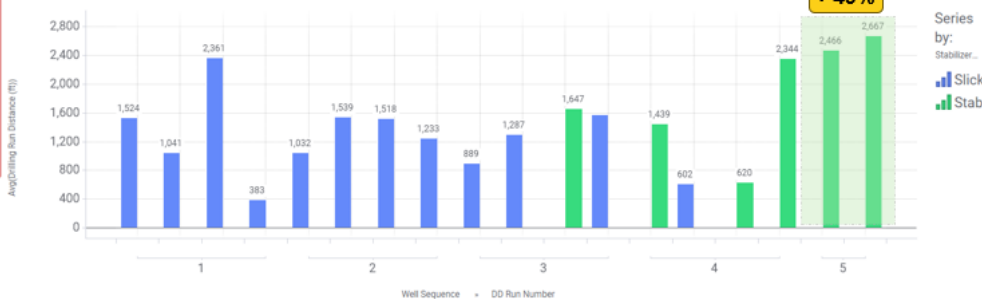
Drilling Run Distance (ft), D&C Time (hr) per Well Seq...



Slide % Distance (%) per Well Sequence, DD Run Number



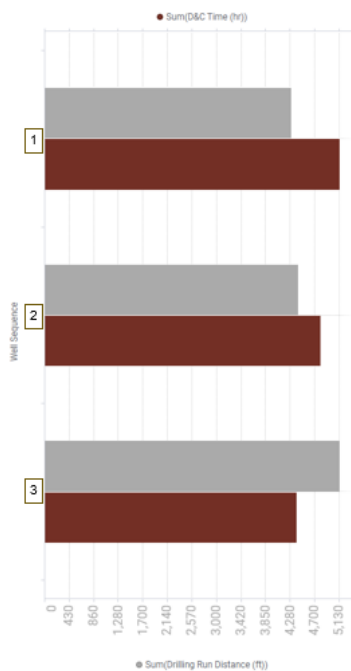
Drilling Run Distance (ft) per Well Sequence, DD Run Number



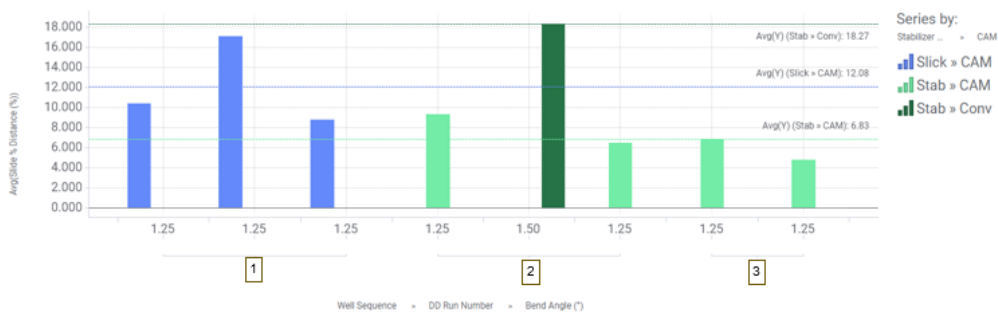
- 5 Sections Drilled
- Sliding distance reduced 48%
- Avg Drilling distance per run improved 49%
- D&C Hours reduced 41%
- BHA's per section
- All same power sections
- Formation

CAM Stabilization and Sliding percentage

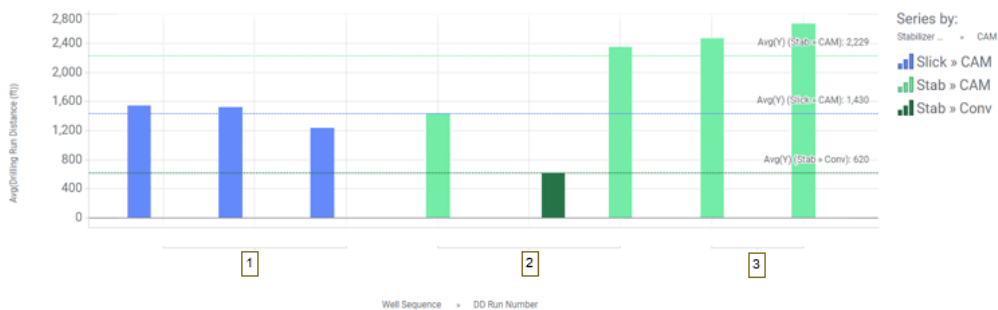
Drilling Run Distance (ft), D&C Time (hr) per Well Seq...



Slide % Distance (%) per Well Sequence, DD Run Number, Bend Angle (°)

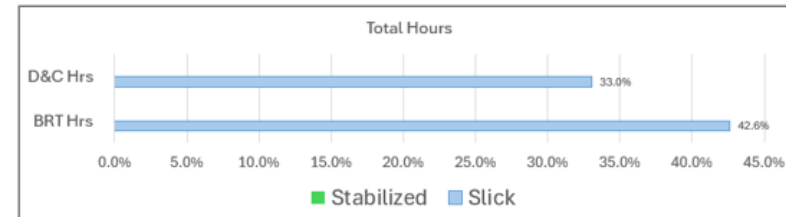
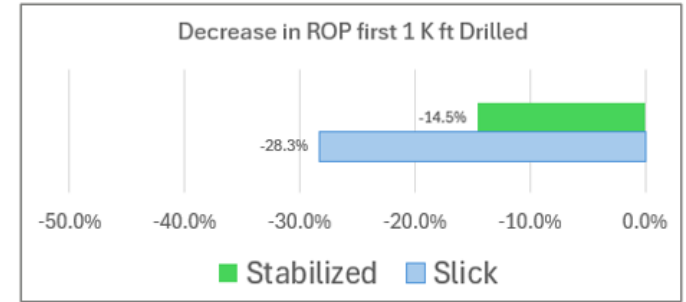
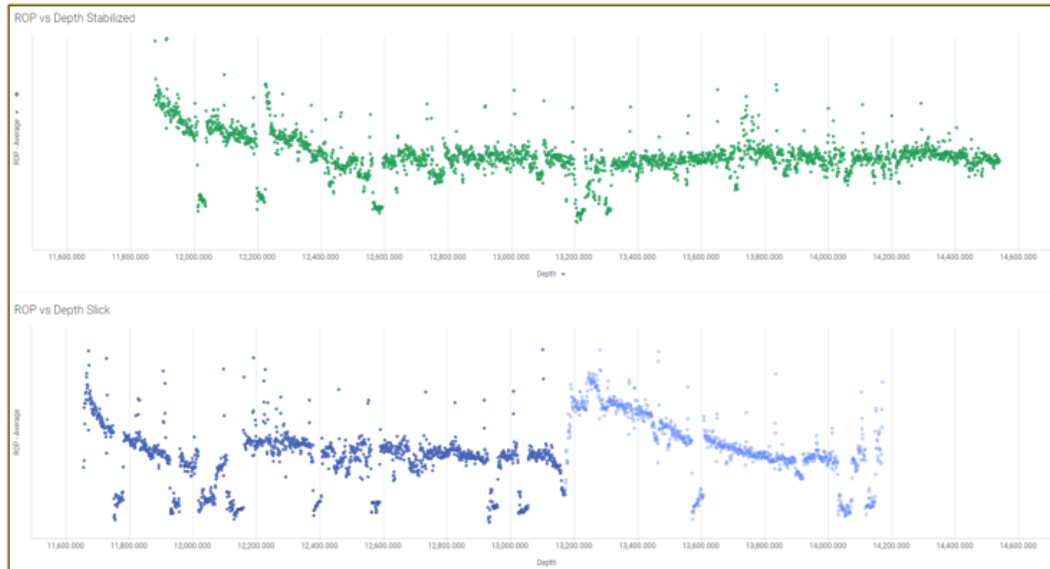


Drilling Run Distance (ft) per Well Sequence, DD Run Number

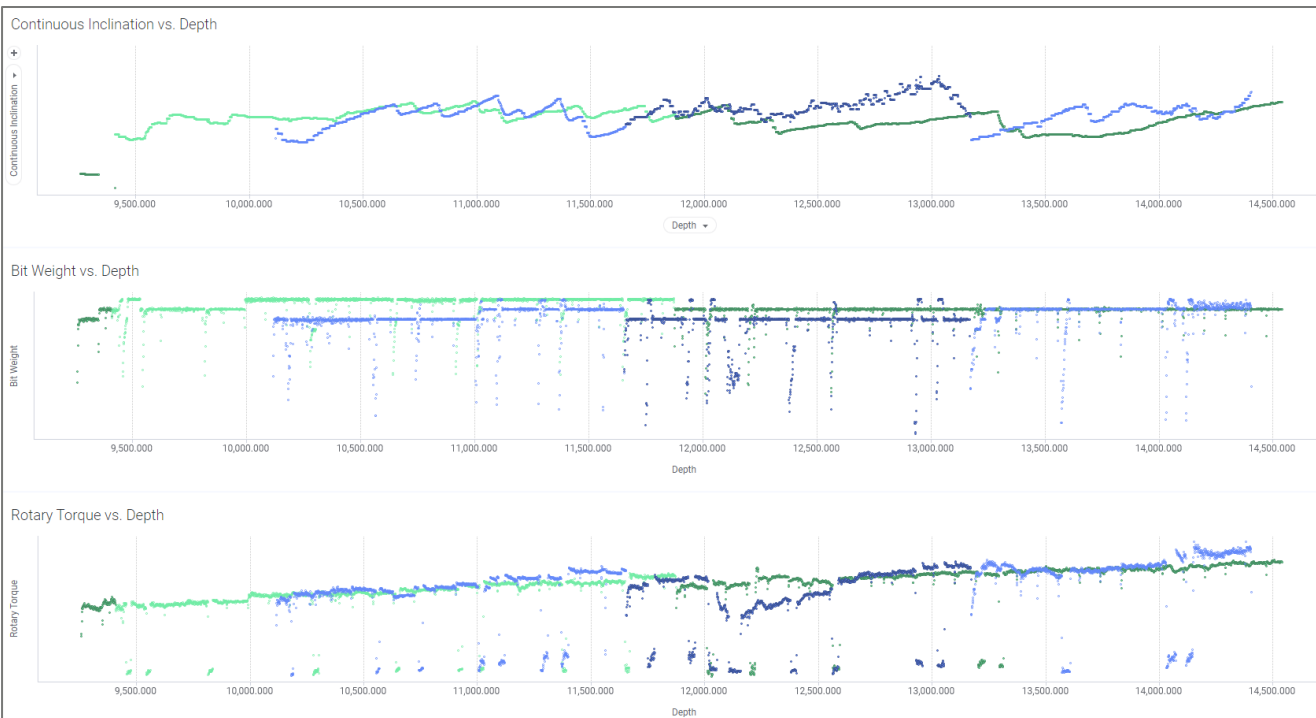


- D&C Hours reduced 22%
- Sliding distance reduced:
 - Highest with Stab Conv
 - - 33% with CAM Slick
 - - 62.6 % with CAM Stab
- Avg Run Drilling distance:
 - Lowest Stab Conv
 - CAM Slick 1.3 Times more
 - CAM Stab 2.5 Times more

Rate of Penetration 1.25 deg bend

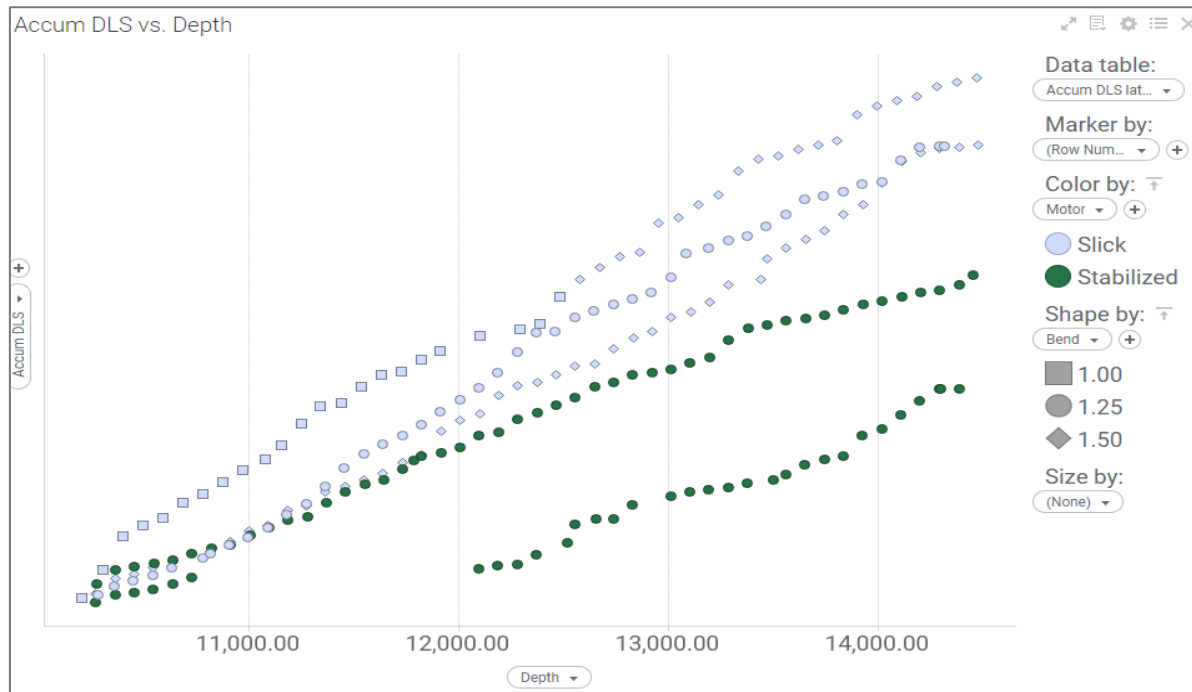


Rotary Tracking Comparison: Slick vs Stabilized



- Stabilized Motors reduced 3 times the BR vs. Slick Motors in Rotary mode
- Higher WOB & effect in rotary tracking
- Effect in Surface Torque

Effects in Cumulative DLS



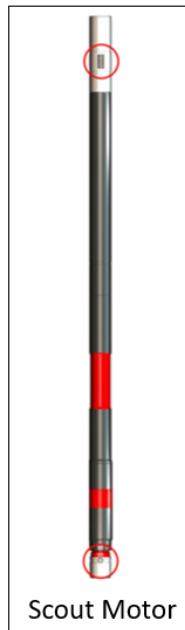
- Accumulated DLS
- Effects of Bend:
- Effects of Stabilization
 - Lower Accumulated DLS with Stabilizer

Downhole Sensors



1.87" Diameter x 1.12" Depth 0.75" Diameter x 5.80" Length

Description	PuK	CuBIC®
Logging Trigger	RPM or RPM Delay	RPM or RPM Delay
3-Axis Shock	-200G to +200G (+/- 100mG)	-200G to +200G (+/- 100mG)
Shock Sampling Rate	800Hz-1600Hz	800Hz-1600Hz
Shock Record	Continuous	Continuous
Gyro RPM	+/- 1000 RPM	+/- 1000 RPM
Gyro Sampling Rate	100Hz-1000Hz	100Hz-1000Hz
Gyro Record	Continuous	Continuous
Temperature	Standard 150°C (302°F) High Temp 175°C (350°F)	Standard 150°C (302°F) High Temp 175°C (350°F)
Pressure Rating	15,000 psi	15,000 psi
Record Life	150 hours at 800 Hz 100 hours at 1600 Hz	150 hours at 800 Hz 100 hours at 1600 Hz



Scout Motor

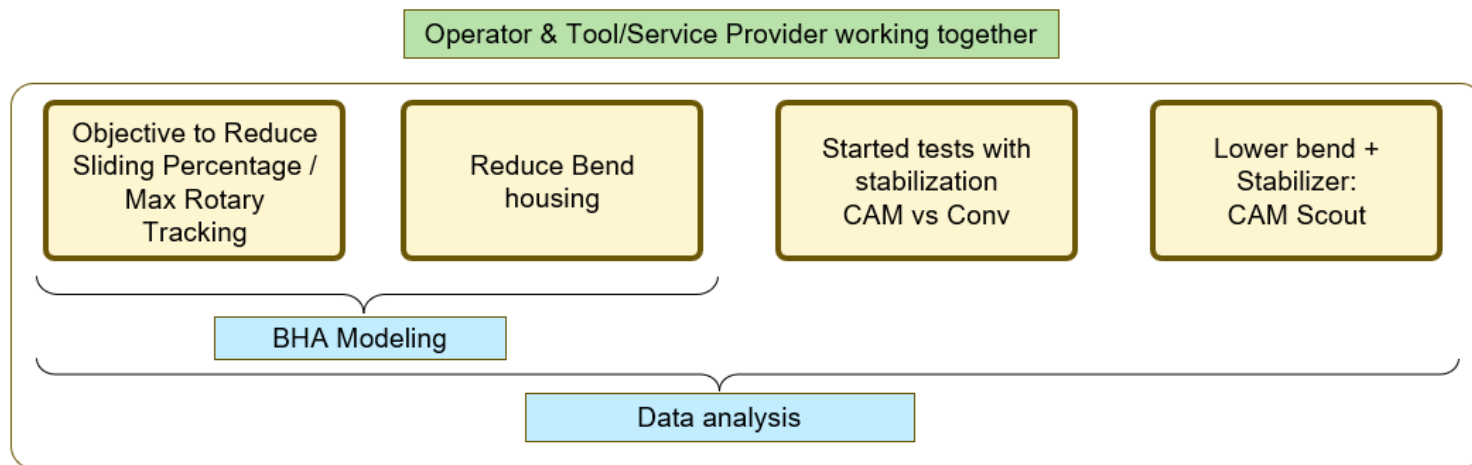


Carrier Sub



Drill Bit
Shank & Centerline

Conclusion



CAM Scout is a proven technology to lower the bend housing and still produce high Motor Yields, but if paired with proper stabilization design and placement, it can improve rotary tracking to increase drilling efficiency and wellbore quality

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Thank You