

Advanced Oilfield Technologies

Rotary Steerable Systems in Turkmenistan

Schlumberger Private

Schlumberger

Schlumberger in Turkmenistan

- Since 1992
- Work with all Oil Operators
- Full spectrum in Exploration and

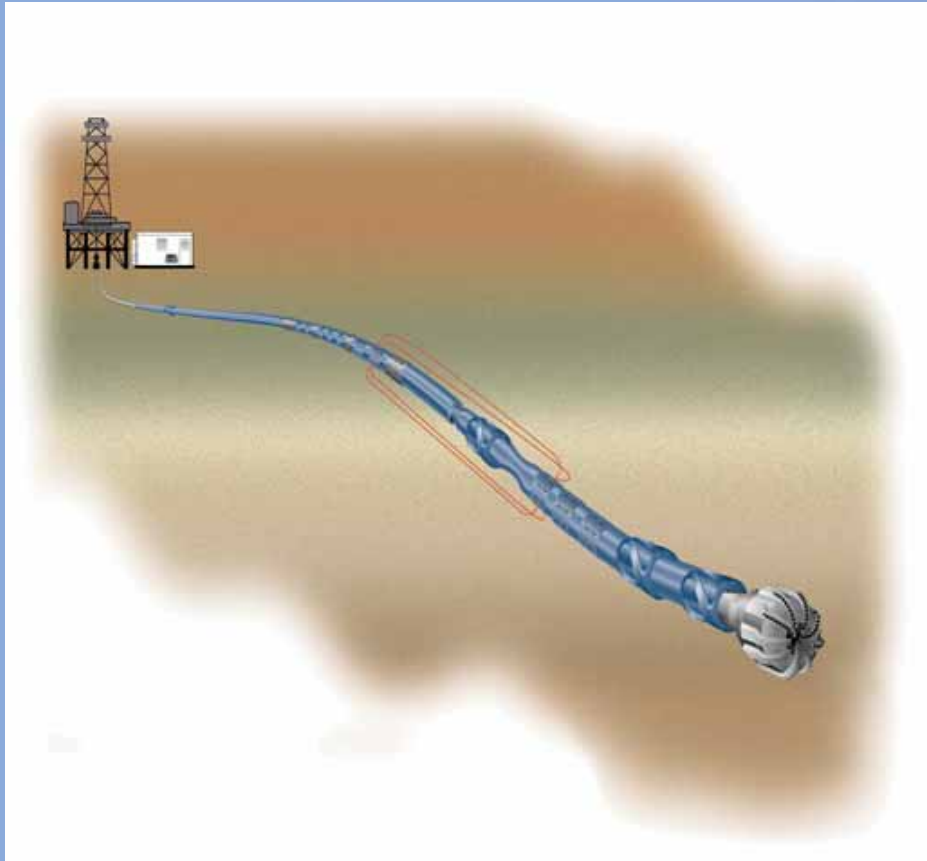
Production:

- Seismic acquisition and processing
- Software products
- Interpretation and Data Management
- Directional Drilling
- Drilling Fluids
- Logging (open and cased hole)
- Perforation (alliance BalkanNefteGeofisica)

Directional Drilling Methods

- Rotary (whipstock)
- Downhole motors (sliding)
- Rotary Steerable

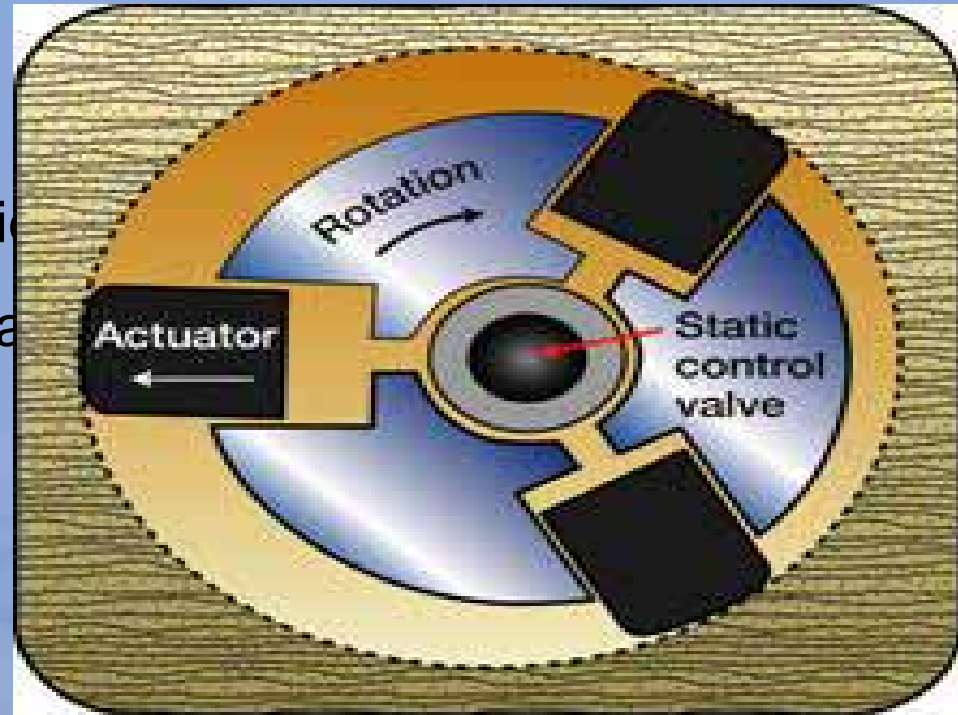
Sliding Problems (Downhole Motors)



- Maintaining orientation
- Low effective ROP
- Poor hole cleaning
- Inability to slide
- Differential sticking
- Buckling and lock up
- High tortuosity
- Build-up rate formation sensitive

Rotary Steerable Systems - PowerDrive

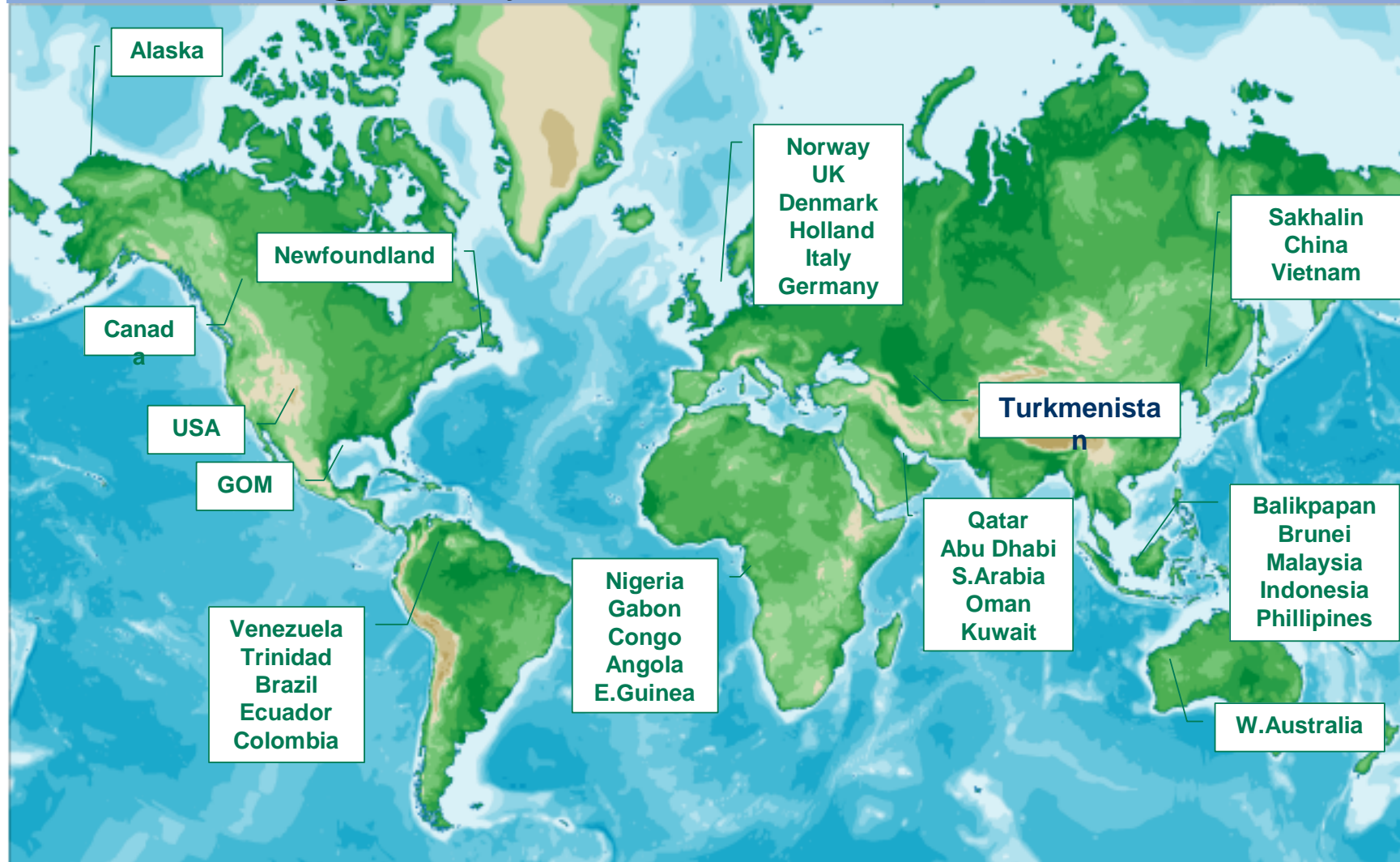
- ALL Parts of the tool rotate
- Full Backreaming Capabilities
- Reduce Stuck Pipe Potential
- No Annular Bottlenecks
- Can Kick Off from Vertical
- Inclination AND Azimuth at once
- Available for ALL hole sizes
- Better quality LWD measurements (hole spiraling)
- Simple, Reliable – doesn't require multiple trips for correction



A History of PowerDrive Performance



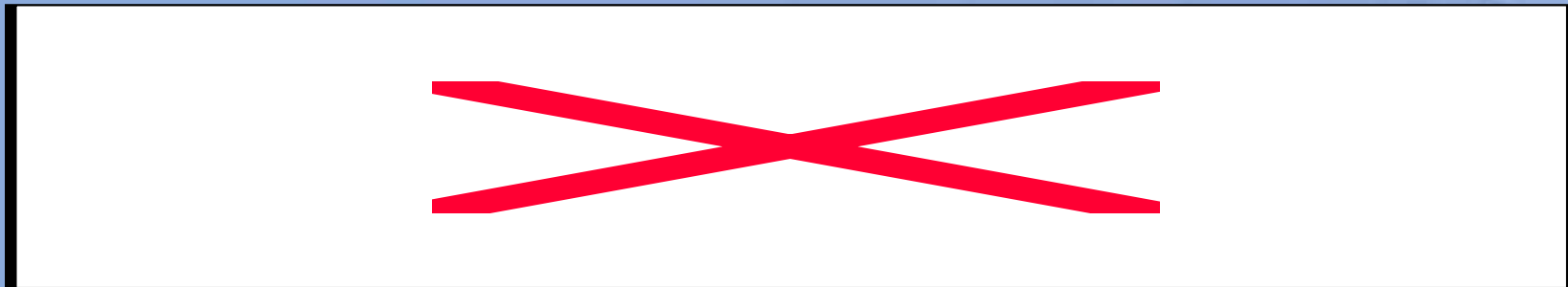
A Geography of PowerDrive



Caspian Clients & Operations

- Dragon Oil Turkmenistan – Lam field Development
- Burren Resources Turkmenistan – Burun field – Vertical drilling
- Petronas Carigali – Vertical Drilling
- Maersk Turkmenistan (upcoming) – Vertical Drilling
- BP & AIOC Azerbaijan – Azeri, Chirag & Shah Deniz fields
- Maersk Kazakhstan – Dunga field Horizontal
- Agip KCO, Kazakhstan – development drilling

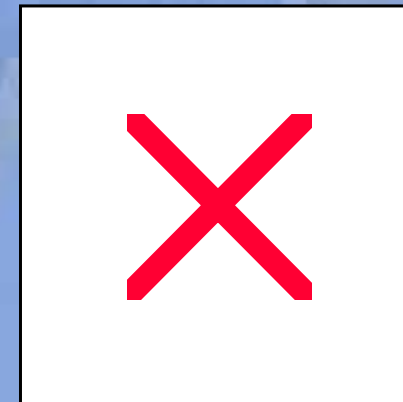
(RSS) PowerDrive – How it works?



Pad out



Pad in

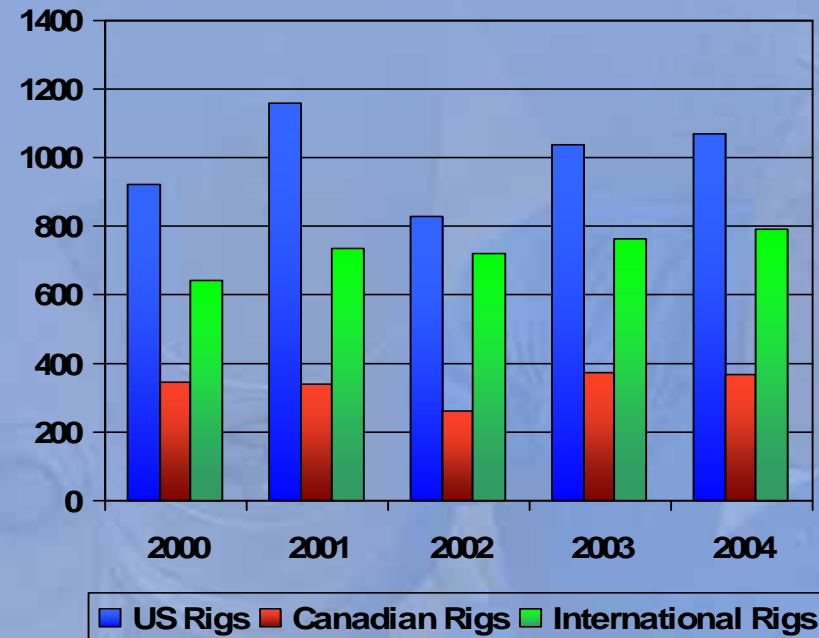


Vertical Drilling

- Considered “easy and cheap”
- Requiring minimal planning
- Regarded as technologically backward

Vertical Drilling

- Represents at least 55% of the world's drilling activity
- Over 50,000 vertical wells will be drilled worldwide in 2004[†]



Spears & Associates, Inc. Oilfield Market Report 2003

[†] excluding Russia and China

Vertical is a Direction...

- Estimated some 20-30% of all conventionally drilled vertical wells need at least one correction run
- In hard rock or high formation dip drilling correction runs are often unavoidable



The PowerV Advantage

- Automatically seeks and maintains vertical 100% of time
- Richard Gray - Burren Resources,
WW Drilling Manager





PowerDrive vorteX

Integral power section
for performance drilling

PowerDrive vorteX – Optimized Drilling Every Time

Optimal Drilling is the result of:

- Higher ROP
- Simple
- Cost-Effective



PD vorteX Applications

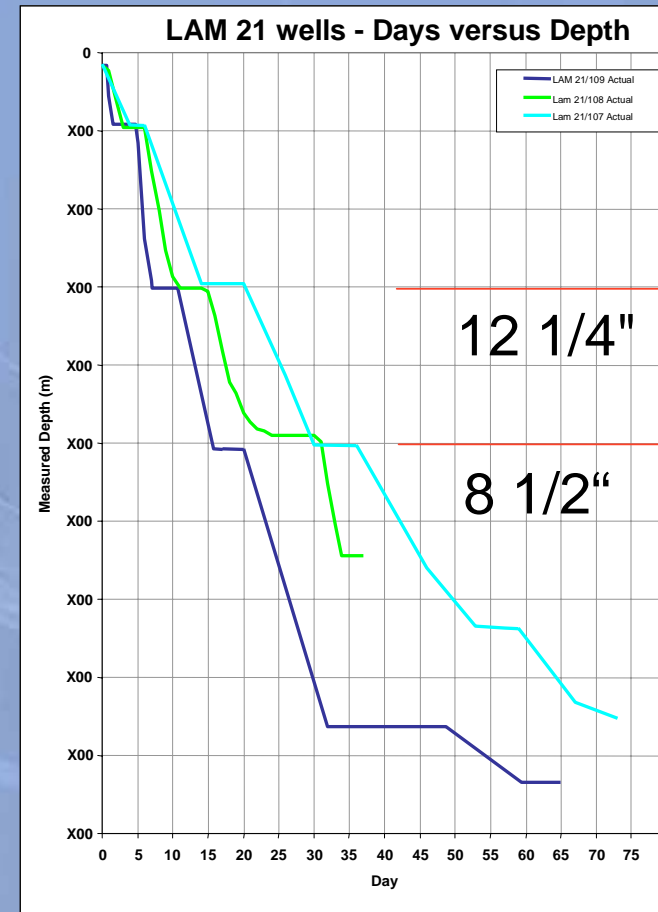
Challenging downhole environment:

- Hard rock, problem formations
- High shock / vibration / stick slip
- Differential sticking
- Rig / Top Drive limitations
- Tubulars
 - Casing wear
 - Drill pipe fatigue

Technology evolution - PD vorteX

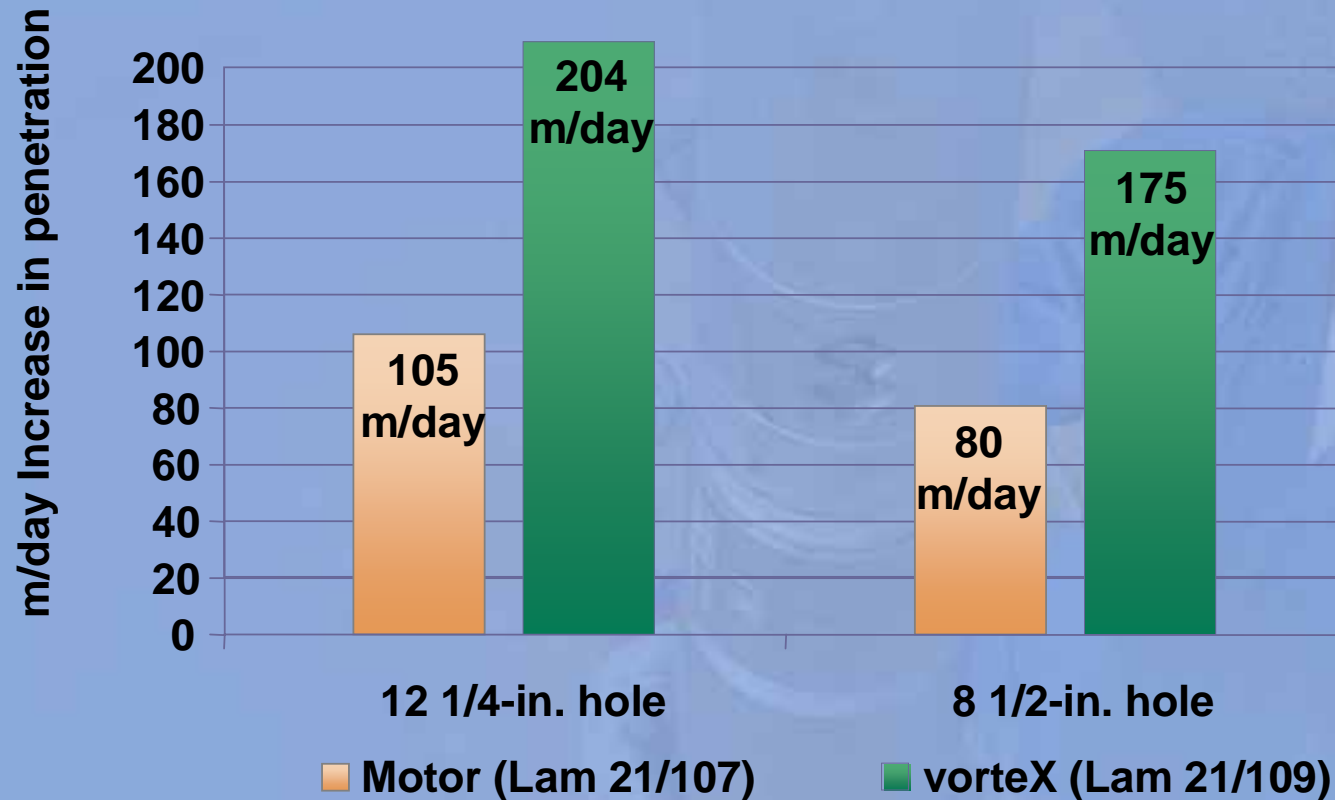
Location: LAM, Caspian Sea

- Lam 21/107
 - motors only
- Lam 21/108
 - motors down to 12 1/4" TD
 - vorteX in the 8 1/2" section
- Lam 21/109
 - motors to 16" TD
 - vorteX in the 12 1/4" and 8 1/2"
 - motor in 6" section



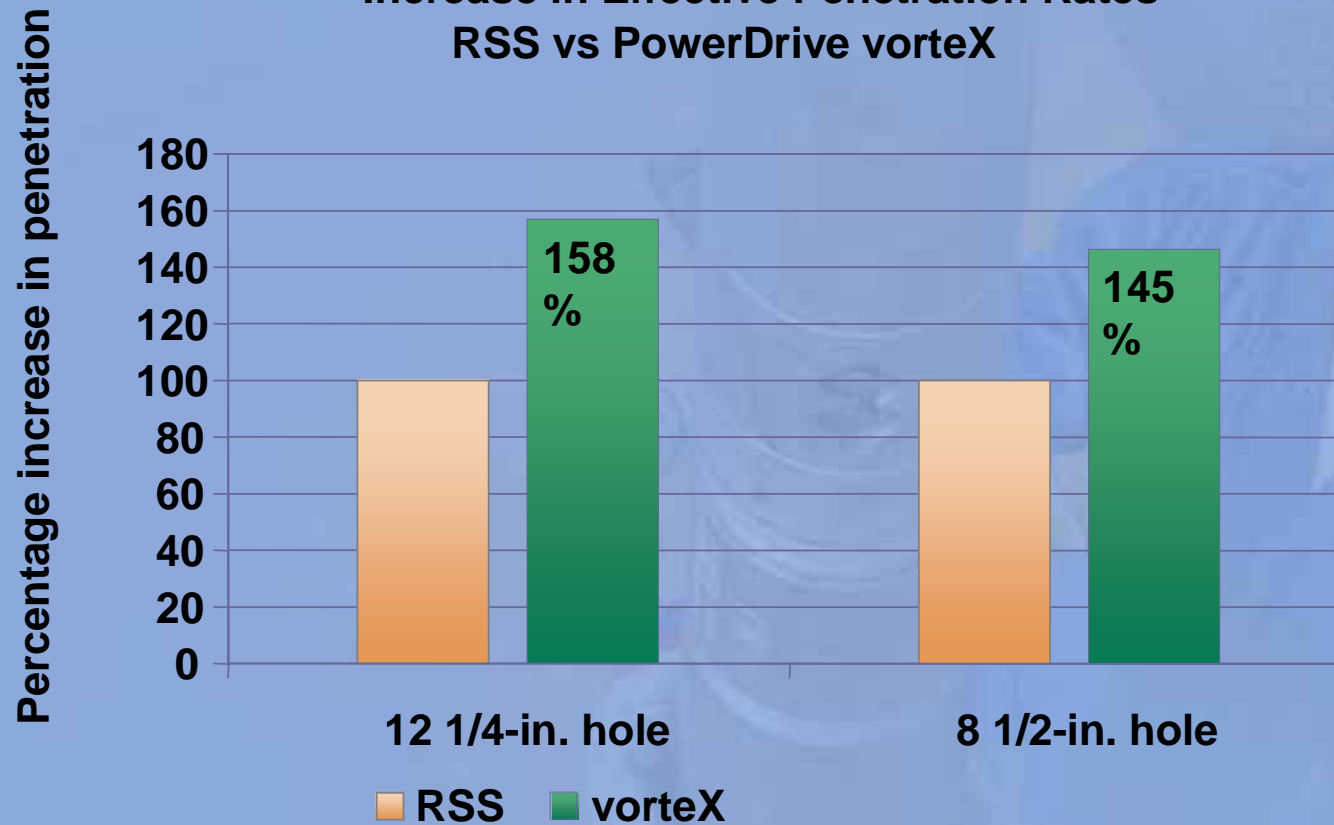
Performance Gains in LAM field

Increase in Effective Penetration Rates
Conventional Motor vs PowerDrive vorteX



Average Performance Gains (worldwide)

Increase in Effective Penetration Rates
RSS vs PowerDrive vortexX



Summary:

- Everything rotates
- Steering without interference to the drilling process
- Adaptable to most drilling rigs
- Effective and cost-efficient

A cost effective solution to the drilling challenge

Questions?



Thank you.