True Drilling Efficiency: Lead, Follow or Get Out of the Way

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Heading into low rig count high oil production

Shale drillers took over marginal production from Saudi Arabia

Drilling efficiency is a key to staying in business

Red line – the gas story
Created lots of gas with low rig count

Green line – new oil story
Expecting lots of oil with low rig count
US land drillers reacted to low gas price

A story of a tight gas driller 15,000 ft ‘S’ shaped wells
> 2000 ft (600 m) per day opposite sides of the world – land and tender platform

DJ Basin Colorado

Gas price crash

Offshore Thailand

Bankruptcy
Europe struggles to perform

Now in declining trend

Averages from data:
• Land Europe 300 ft / day
• Land USA 800 ft / day

OG 21 Sources: NPD, Statoil, Petoro

280 ft / dy

425 ft / day

230 ft / day

40%
Doubling performance in Europe proven by Lean Drilling™

560 ft. / day overall vs. 262 ft. / day historic best (plateau)

Halved completion time
Cut well cost 35%
Lean Drilling™ repeated step change improvement

Lessons from application

• **Organization Architecture** = alignment to objectives thro aligned delivery systems across breadth & depth of organization

• **Culture change / team building** = vision, values, equal players, common objective

• **Performance gap recognition** = team owned stretch goal (MTP beyond TL, BIC, BOB)

• **Project services systems** = professional detailed scheduling, cost est / control, risk management
Breakthrough drilling performance ingredients

Ford Brett: Study identified step change above benchmarks & analyzed causes: GRI 1997 through today

latest step change made $35 bbl economic

- **Commitment** = “We are going to do this no matter what”
- **Detailed process focus** = “The devil is in the details”
- **Involvement** = “Everyone (all competencies) participates”
- **Financial return** = “Need to see return to make investment”
How **NOT** to have a Breakthrough

- Keep doing things the same old way
  - a breakthrough requires change, and change requires commitment.
- Don’t sweat the details
  - Rarely (never?) is a breakthrough one “magic bullet.”
- Only involve the experts
  - A breakthrough touches everyone’s job
- Don’t invest time & effort to change
  - A breakthrough requires 5 - 10 X the normal planning, engineering, and coordination
Target a true drilling efficiency ratio: Face the facts and stop the hype

ACTUAL WELL DURATION

Industry Normal Well Time

Reported as Productive Time (PT)

Theoretical Well time

Invisible Lost time (ILT)

Conventional Lost or down time (NPT)

Focus on NPT alone has negative performance impact

MTP – Maximum Theoretical performance
TL – Technical Limit
BIC – Best In Class
BOB – Best of the Best
Case studies: MTP application

Mid East Land Drilling – Dayrate, High Complexity, high risk area (terrorist activity)
Case studies: MTP application

Deep Offshore Far East Drilling - Appraisal
Case studies: MTP application

Mid East Land Drilling – Lump Sum Project Managed
Case studies: MTP application

USA Land – “Super” Performance Drillers
Drilling performance is now competitive advantage

Rig activity will be performance driven as never before

- **Region to region**: Europe is far behind / Mid East often wins on well production rates
- **Operator to operator**: drives well cost and production timing = profitability
- **Project to project**: drives NPV so drives well opportunities
- **Contractor to contractor**: winners and losers