TeleCoil Real-Time Downhole Communication System
Insight Through Coiled Tubing

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TeleCoil System

• Communication system with real-time downhole data
  – Through a non-intrusive electrical conduit
  – Enables optimization of conventional CT interventions
  – Permits the use of wire line logging tools.

• Comprised of three main components:
  – TeleCoil Conductor
  – Bottom hole assembly
  – Surface hardware & data acquisition system
Technology Development Drivers

- Accurate BHA depth referencing is critical
  - Perforating,
  - Setting isolation devices,
  - Cleaning completions components, etc.

- Existing depth measurement techniques include:
  - Surface depth counters
  - Tagging known reference depths
  - Profile locators / end of tubing locators
  - Memory CCL tools
  - Braided cable (Stiff-wireline)

- These methods have inherent errors, are un-reliable or operationally impractical
Braided Cable (Stiff-Wireline) Challenges

– Use of ball operated tools
– Issues with wire termination
  • Time required
  • Unreliable electrical connection
  • Electrical isolation problems
– Frequent slack management
– Fluid compatibility
– Chloride corrosion
– Increased fluid friction
– Increased string weight

7/16” braided cable in 2” CT
TeleCoil Conductor

- 1/8” OD corrosion resistant alloy tube
  - housing insulated electrical conductor
    - Non-intrusive
    - Passage of activation balls
    - Extremely quick head up (<30 minutes)
    - Minimal slack management
    - Compatible with oilfield fluids / slurries
    - No effect on flow rates, friction pressures
    - Minimal weight (≈ 1/10th of braided cable)

1/8” TeleCoil conductor in 2” CT
TeleCoil Conductor

• Required new injection system
  – Capstan systems not appropriate

• Suitable for installation in various sizes of coiled tubing
  – 38.1 mm through 73 mm

• Patented engineered process and equipment allows installation in most lengths of coiled tubing
  – Successfully installed in up to 8200 m
TeleCoil Bottom Hole Assembly

• Head up
  – Connects to tubing end connector
  – Provides rapid wire connection
  – Allows electrical and mechanical quick connect
  – For use with multiple bottom hole assemblies
TeleCoil Bottom Hole Assembly

• Integrated Sensor BHA
  • 2 7/8” OD, 60” Length
  • Designed for 114.3 mm to 177.8 mm casing
    – Including 13 Chrome and premium connections

Sensor package
• Casing Collar Locator (CCL): developed internally
  • Resolution down to 5 m/min
• Two pressure sensors: internal and external
  • Yields BHA difference pressure

Motor head
• Double flapper check valve
• Ball activation:
  • Wire release
  • BHA disconnect
  • Circulation port
  • Passage of ½” ball
TeleCoil Bottom Hole Assembly

• Logging Adapter
  – Electrical feed through for logging tools
  – Quick connect with motorhead
    • Ball activation:
      – Wire release,
      – BHA disconnect
  • Check valves
  • Flow ports
  – HS&E risk reduction
    • Eliminates need to rig down coiled tubing and rig up wireline unit for logging run
Depth Correlation

- Provides accurate depth reference
- Identification of various hardware within wellbore
  - Increased safety when pulling out of hole
Optimizing BHA Functions

- PDM Milling operations

Real-time DH Pressure = Improved Performance
BHA Function Confirmation

- Opening circulation port above PDM
BHA Function Confirmation

- TCP Operation
  - CCL confirms accurate depth
  - Pressure confirms ball activation
  - Temperature confirms detonation – Reduced surface hazard
Integrating Logging and Intervention Capability

- North Sea Case History:
  - Sand production - Shut in.
- Run 1: CT Intervention run
  - Underbalanced cleanout
    - pressure monitoring and depth confirmation
- Run 2: Logging run
  - Multi-finger caliper and sand detection tools
- Run 3: CT Intervention run
  - Set isolation plug in 8 ft pup joint
- Run 4: CT Intervention run
  - Acidize upper zones, monitor depth, P&T for reactions
- Run 5: Logging run
  - PLT log
- Results: increase in oil production, no sand
TeleCoil Deployments

• First installation in Aberdeen, UK
  – First run January, 2010

• Over 200 runs, 725k running metres
  • Cleanouts, milling, jetting, acidizing, fracturing, fishing, gas lifting, perforating, PLT, Caliper, Sand detection, plug setting

• Currently operational in:
  – Azerbaijan
  – India
  – Netherlands
  – New Zealand
  – Norway
  – UK

• Increased demand for job optimization and successful execution
  – Frequent requests for TeleCoil Technology
Summary

• New technology providing non-intrusive real time data and operational flexibility

• Decreases HS&E risk exposure
  – Decreased rig up/down
  – Temperature confirms perforating gun detonation

• Increases operational efficiency and reliability
  – Reduces job time through better BHA control & performance
  – Reduces mis-runs due to depth errors or uncertainty of BHA operations
  – Real time logging ensures accurate data in one run

• Provides customers single solution
  – for data gathering and required intervention
TeleCoil Downhole Communication System

Thank you for your time. Questions?