REAMERS – THE GOOD, THE BAD AND THE UGLY

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Proper reamer selection requires planning

- What reamer configuration best addresses the bore geology?
- What cutting structure is appropriate – MT, TCI, PDC?
- How does rig equipment / set up impact reamer selection?
- How should a contractor operate based on tool selected?

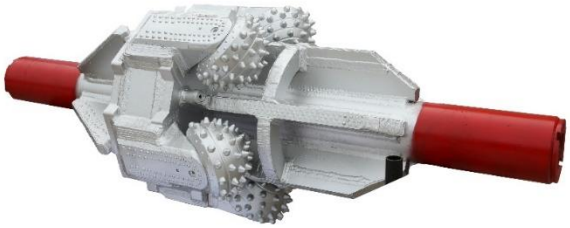
Not all reamers are created equal

Split Bits

- Oil field tri cone bits split and welded to body

Replaceable Reamers

- Roller cone segments designed for HDD specific replaceable reamer platform



PDC Reamers

- PDC insert “Fixed cutter” based reamers designed for HDD applications

Traditional split bit tools

Benefits

- Relatively low cost
- Readily available
- Single project use
- Multiple cutting segment options available

Considerations

- Quality & availability of segments varies dramatically
- “custom” tools each time
- Segments designed for tricone bit, not HDD reamers
- Traceability & QC difficult
- Purchase only

Replaceable cutter HDD reamers

Benefits

- Designed for rebuild and reuse
- Segments specifically designed for HDD applications
- Multiple cutting segment options
- Fully traceable materials
- More consistent quality and performance
- Rental or purchase options

Considerations

- Typically higher cost vs. split bit reamers
- Tools must be repaired and maintained

PDC/fixed cutter reamers

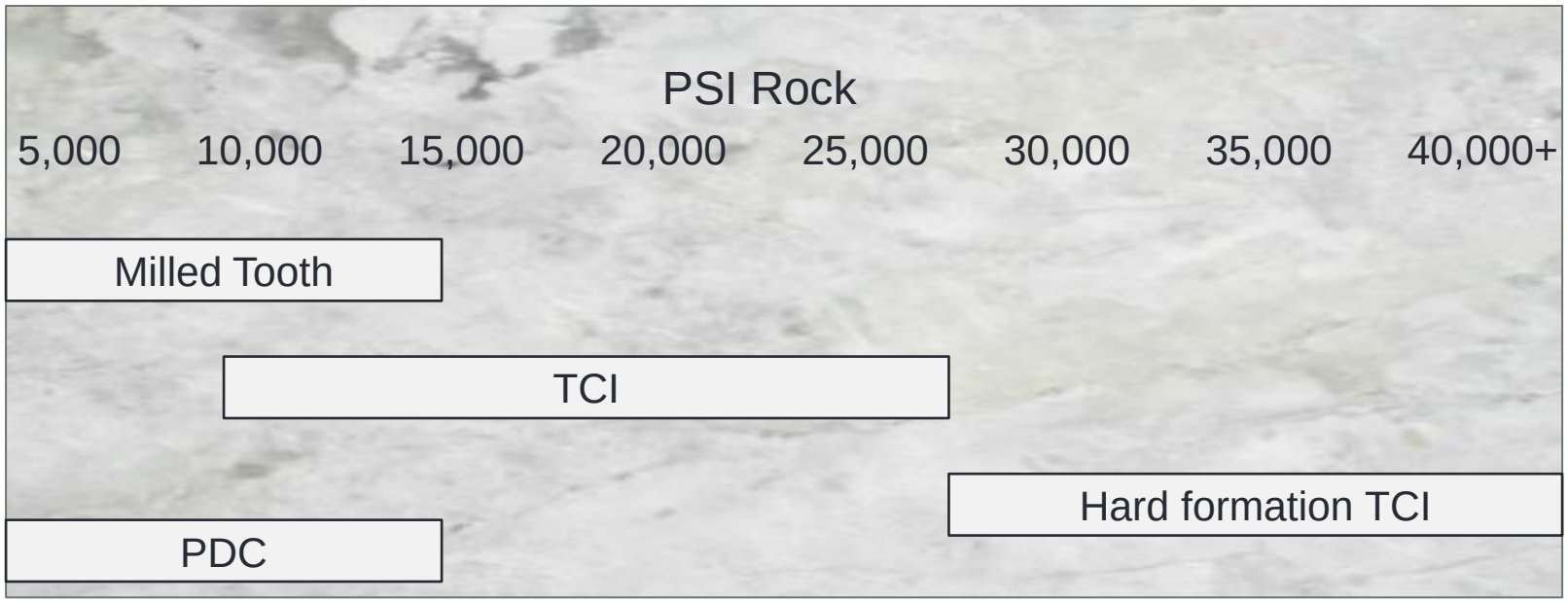
Benefits

- No moving parts
- Effective in consistent formations
- Can be repaired and reused
- Tools specifically designed for HDD use

Considerations

- Require significant pump capacity to be effective
- Larger diameter tools more difficult to operate
- Performance suffers in changing formations

Formation drives cutter selection



Reamer operation

- Reamers must align with rig equipment
  - Drill pipe / connections
  - Required force
  - Pump capacity
- Follow manufacturer's recommendations for pull/push forces, RPM and fluid volumes
  - The harder the rock = higher pull forces and slower RPM
  - Hole cleaning is critical to maintaining tool life
- Centralize the reamer properly
- "Seat" the reamer before increasing forces
- Adjust operating parameters for changing ground conditions
- Track and monitor reamer life

Questions?