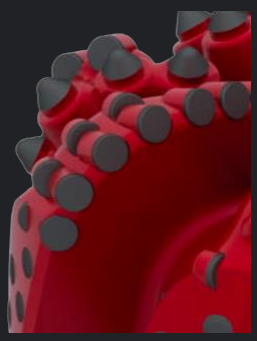
Hybrid Bits

Hybrid bits with combined PDC shearing and Insert gouging.

Fast, durable, tough and smooth







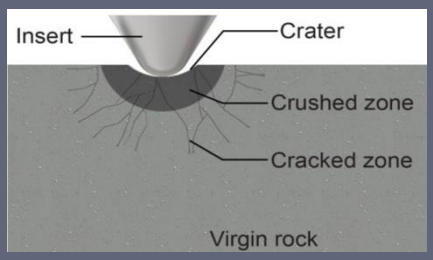
Harts E&P Hybrid Drill Bit World Record Holder

10,000+ Runs worldwide

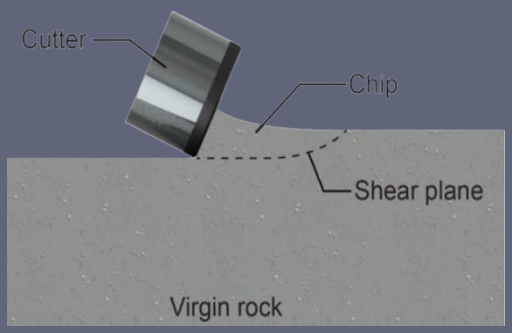
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Hybrid cutting structure that combines Pexus™ Inserts and PDC cutters.

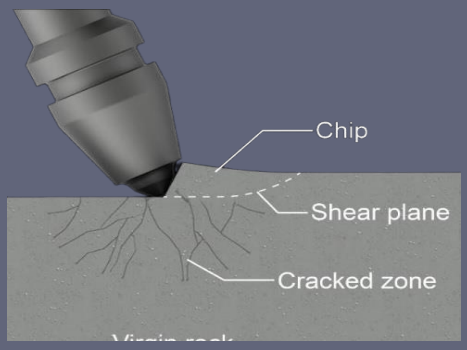
How it works: Hybrid bits employ a combination of roller cone crushing action and PDC shearing action to provide smooth response and extended life in hard transitional formation drilling.



Conventional roller cone insert crushing action



PDC cutter shearing action



Pexus™ element gouging action

The patented Pexus™ technology introduces a hybrid solution with no moving parts. The leading gouging element pre-fractures and relieves stress ahead of the PDC cutter, thereby lowering the cutter work rate and protecting it from debris encountered during even the hardest drilling. Fine tuning of the cutting structure determines how each component engages the formation allowing greater flexibility for specific application design.

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Hybrid Bits

Powere by Pexus™

AZCO Diamond

Low vibration, smooth torque, extended life, high ROP, precise control

The Pexus™ Advantage

- Smooth Torque response - comparable to roller cone bits.
- No rotating cones in the cutting structure.
- Unique body construction gives improved hydraulics, accurate aggressive cutting structure and extremely high abrasive resistance
- High level of cutting structure and shaped insert design flexibility.



Patents
EU. Pat. No 3,042,022 B1
CDN. Pat. No 2,923,060
US. Pat. No 10,107,041 B2



Benefits of Pexus™

<u>Improve drilling efficiency</u>

- Faster, more accurate directional sections
- Excellent ROP in transitional and hard abrasive formations.

<u>Reduce unplanned trips</u>

- No rotating cone limitation gives extended bit life
- Smooth drilling action, very low bit induced vibration for longer BHA tool life and less component wear

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Hybrid Series

Fast, durable, tough and smooth

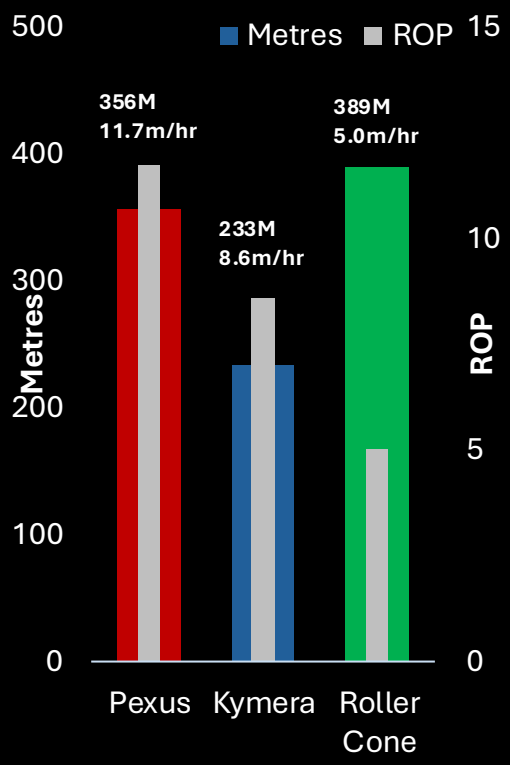
AZCO Diamond

Performance

Drilling Challenge

Alberta Canada : Challenging 8.75” Build section 0^0 -89^0 with PDM through interbedded siltstone shale with sandstone limestone stringers and sideritic concentrations. Operator faced difficulty with poor bit dull conditions, excessive bit trips and difficulty maintaining directional control.

Baseline performance was set with a roller cone bit drilling the entire section with an ROP of 5 m/hr. A hybrid Kymera K524 bit improved ROP to 8.6 m/hr and drilled to TD.



Dull Grades	
Pexus	1-1-WT-N-X-CT-TD
Kymera	1-3-BT-S-E-I-WT-TD
Roller Cone	3-3-BT-A-E-I-WT-TD

Solution

A Pexus™ hybrid SDP3313D was proposed. The run objective was to achieve consistent one run sections with improved dull condition, better directional control and higher ROP.

Results

The Pexus™ hybrid set the new benchmark performance in the application, consistently drilling one run to TD with better dull than offsets.

- **134%** ROP increase compared to Roller Cone baseline performance
- **36% ROP** increase compared to Kymera hybrid
- **100%** one run to TD
- **0** toolface or directional issues

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Hybrid Bit Nomenclature

AZCO Hybrid bits are available from 6” to 22” size with multiple blade / hybrid row combinations that can be custom designed for any application.

For demanding directional work a shankless body is available, bit design attributes are matched to directional drive system, RSS or PDM.



1. **AZCO Diamond Bit**
2. **Bit Series – Shankless Directional, Mill**
3. **Pexus**
4. **Number of Pexus Rows**
5. **Number of Blades**
6. **PDC Cutter Size (mm)**
7. **Optional Features –** Double row of PDC, Extended gage, Shankless, Fixed ports, H –Enhanced Hydraulics, Z – Premium Cutters

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