Track VII-B: HDD

Random Bit Third Cutters for Hole Openers

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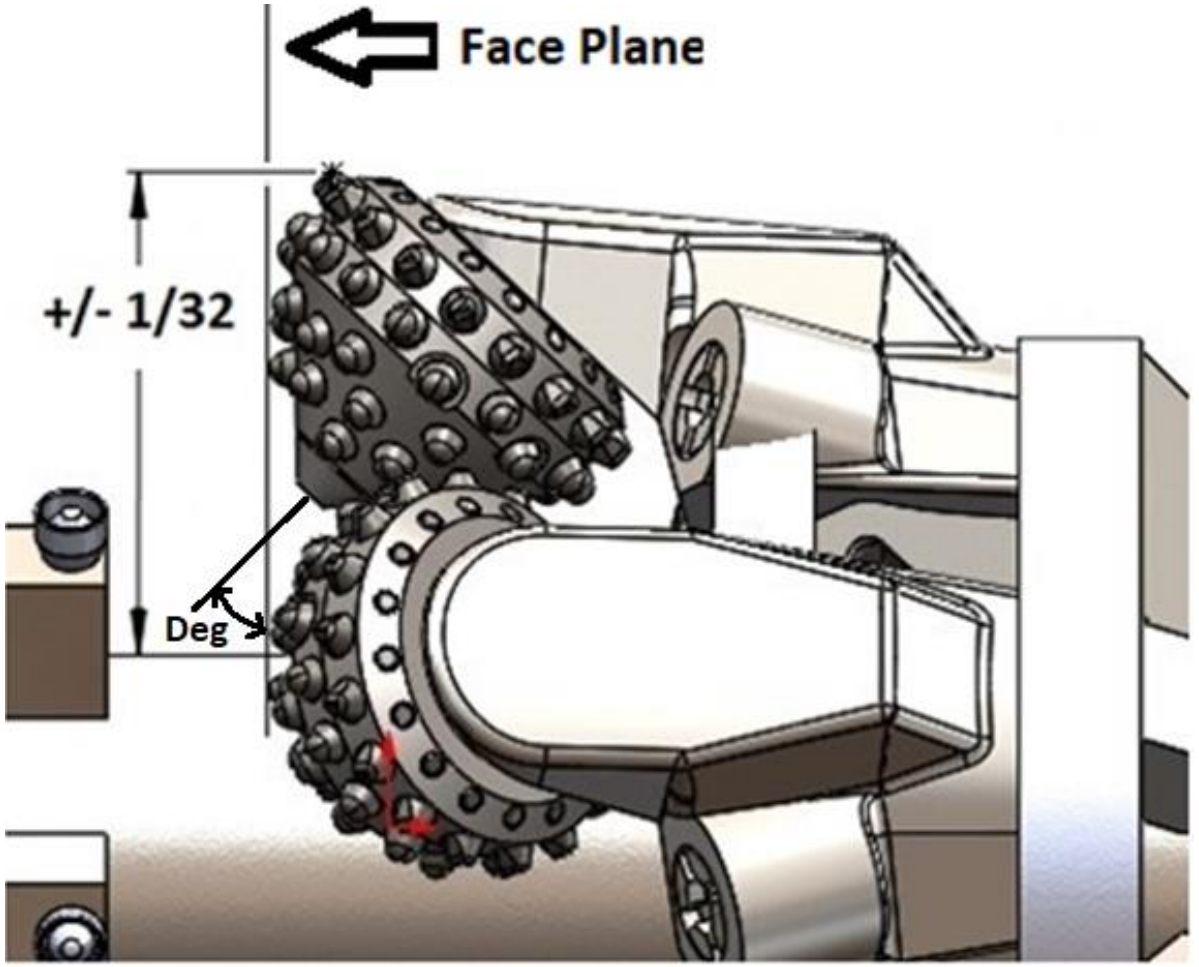
Design and Fabrication criteria for Bit Third Hole Openers

- Design criteria
  - Bit thirds must be equally spaced
  - Use the largest bit third size as possible
  - Bit thirds must be of the same cone diameter
  - Bit thirds must be of the same cutting structure
  - Bit thirds must have the same pin angle and offset

Design and Fabrication criteria for Bit Third Hole Openers

- Fabrication criteria
  - Bit third gage diameter should not exceed 1/32 from Hole Opener centerline.
  - Face of Bit thirds should be on the same face plane within 1/32.
  - Pocket should produce proper degree of Journal pin angle.
  - How do we get there consistently?



Advantages of purpose built HDD Random Bit Thirds

- Interchangeability
  - Standard pocket design
  - One cutter any position
  - Off the shelf ready
    - No cutting bits apart and grinding
    - No machining
  - Quicker turnarounds for refurbishing

Advantages of purpose built HDD Random Bit Thirds

- Only one cutter is required to provide complete “Bottom Hole Coverage”
- Equal loading across the reamer, as each cone is exactly the same.

Advantages of purpose built HDD Random Bit Thirds

- Each cone cuts the same amount of rock providing for balanced wear.
- Consistent distance between cutting teeth on cutter, no large gaps between teeth.

Advantages of purpose built Random Bit Thirds

- Smoother Operation
  - The Random design is more efficient at producing rock failure thru better insert spacing.
  - Very effective for under-powered rigs.
    - Fewer inserts are in contact with the bottom of the hole, increasing effective load per insert resulting in a higher cutting efficiency.
    - Requires less torque than rowed cutters.
  - Generates a more consistent chip size for easier chip evacuation.

Summary

- A Random HDD Bit third design is an engineered solution that makes it possible to standardize Hole Opener designs. Utilizing interchangeable cutters reduces fabrication time while providing the highest level of cutter placement accuracy and integrity.
- A Random HDD Bit third hole opener produces smaller, consistent-sized chips with increased rate of penetration (ROP), while requiring less WOB and torque compared to standard rowed bit third designs.
- A Random HDD Bit third hole opener has equal loading across the cutting face resulting in balanced cutter wear.

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