



WIRELINE
EXPRESS

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INNOVATIONS IN WIRELINE
CONVEYANCE

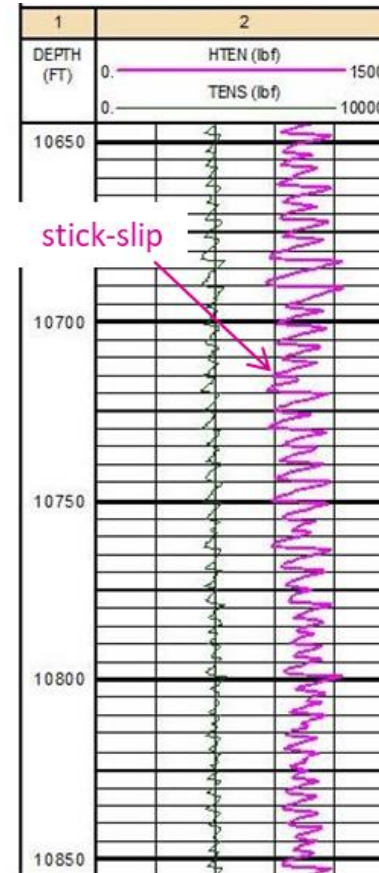
MECHANICS OF
CENTRALIZATION

Martin Leonard
Technical Manager

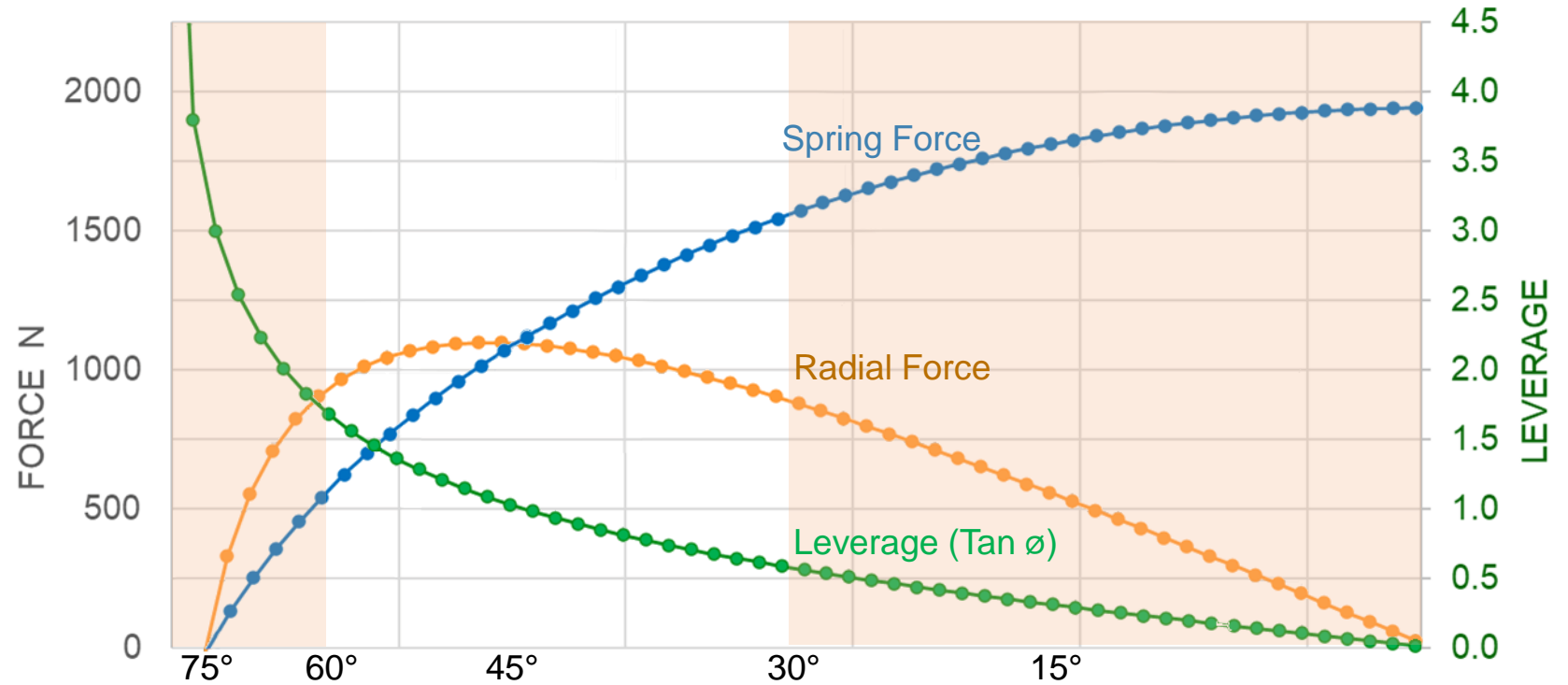
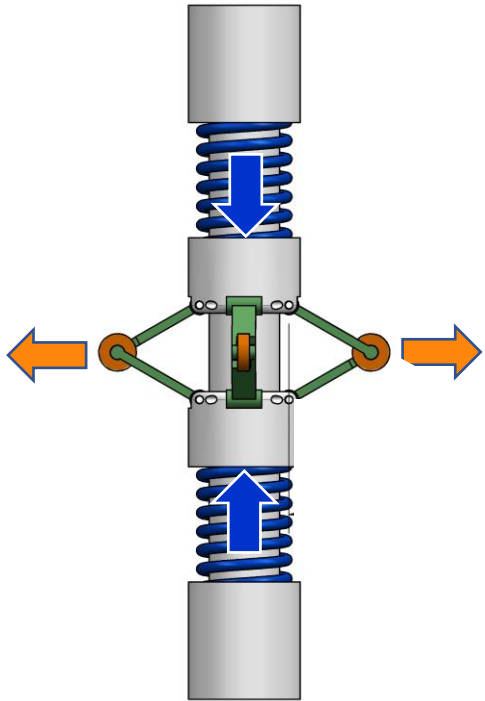
DEVEX2022

Challenges of Wireline Centralization

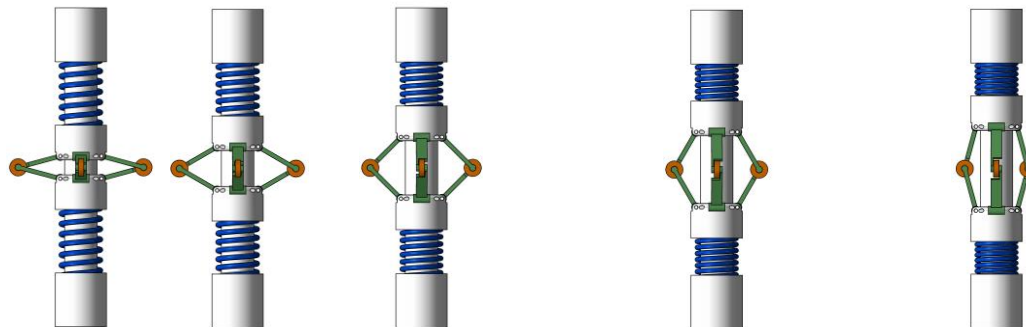
- Ultrasonics, Sonics and Imagers require good centralization in Open / Cased Hole
- Very small tolerances for data quality:
 - Centralization within 0.1" is not uncommon
- Long, heavy wireline toolstrings:
 - New imaging / sonic tools > 1000lbs
- Highly deviated holes
- Requirement for minimal drag
- Avoidance of Stick-Slip



Conventional Centralizers: Mechanism explained



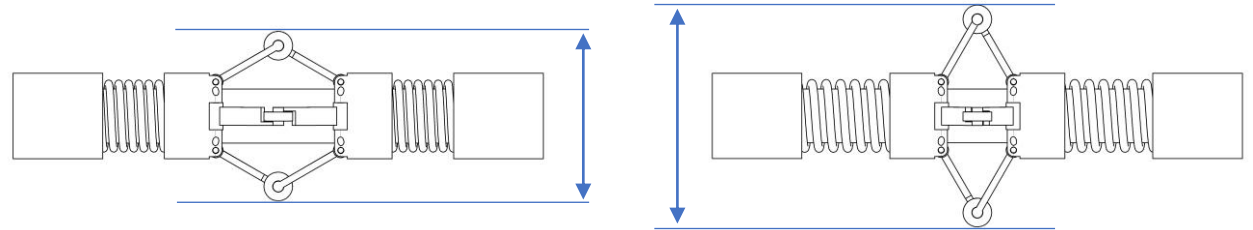
- Arm acute angle
- Holdup



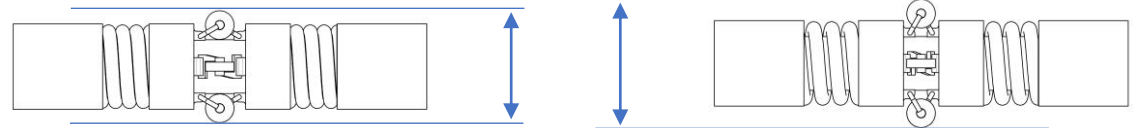
- High Spring force
- High Drag
- Poor mechanism

Current Centralizers

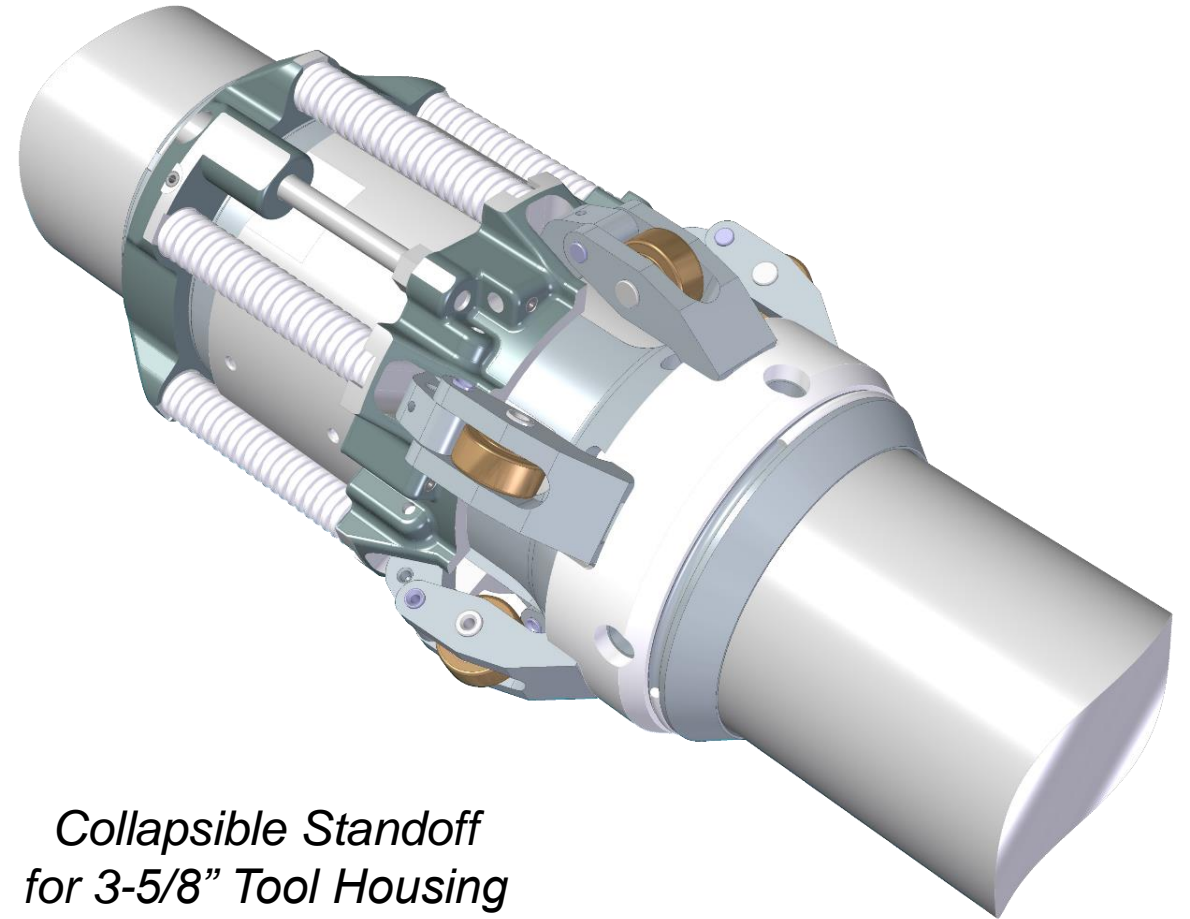
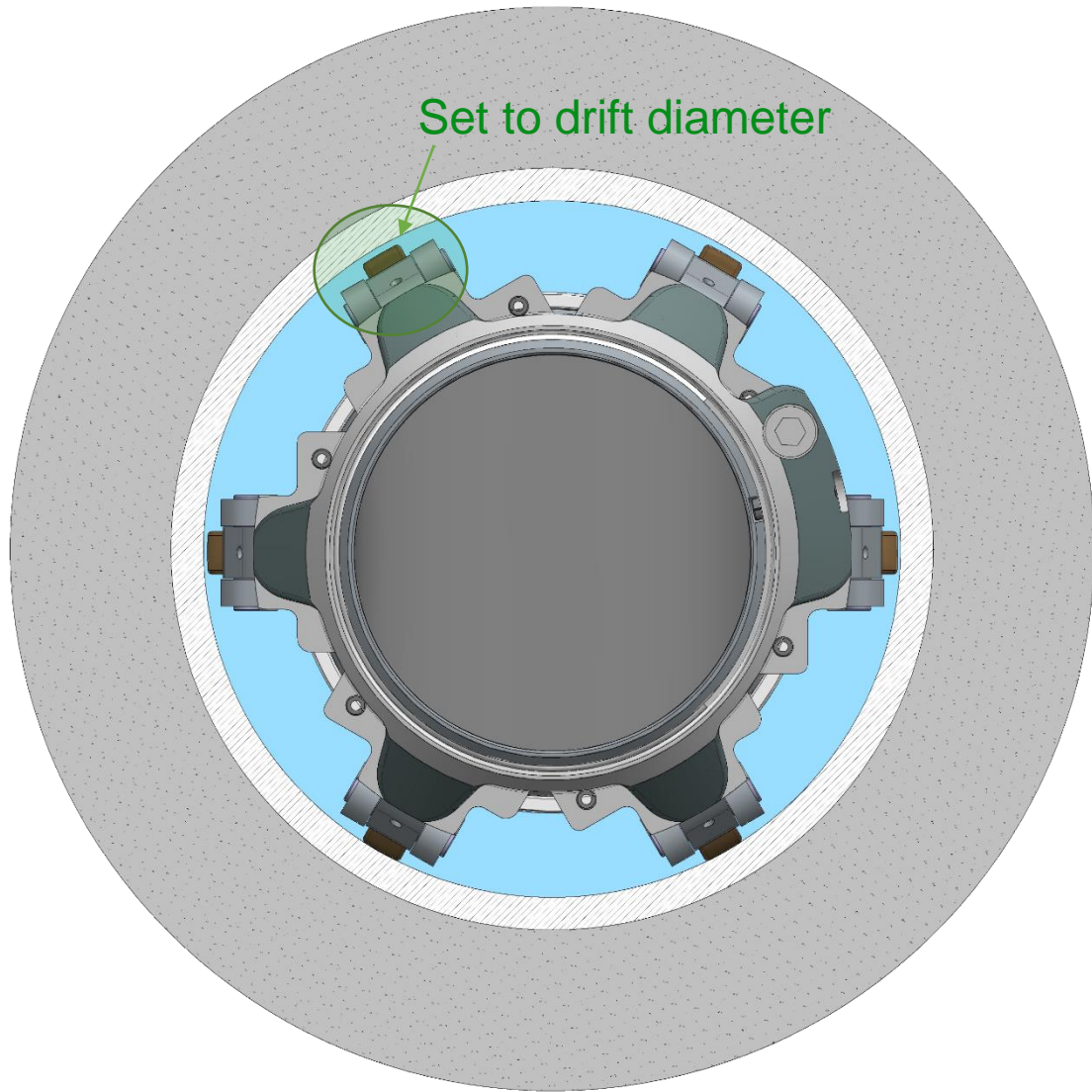
- Centralizers should operate between 30° & 60°
- Limited functional range



- Small Casing Challenge
 - Minimal functional range
 - Low axial displacement - Stiff spring
 - Very poor mechanics – poor centralization

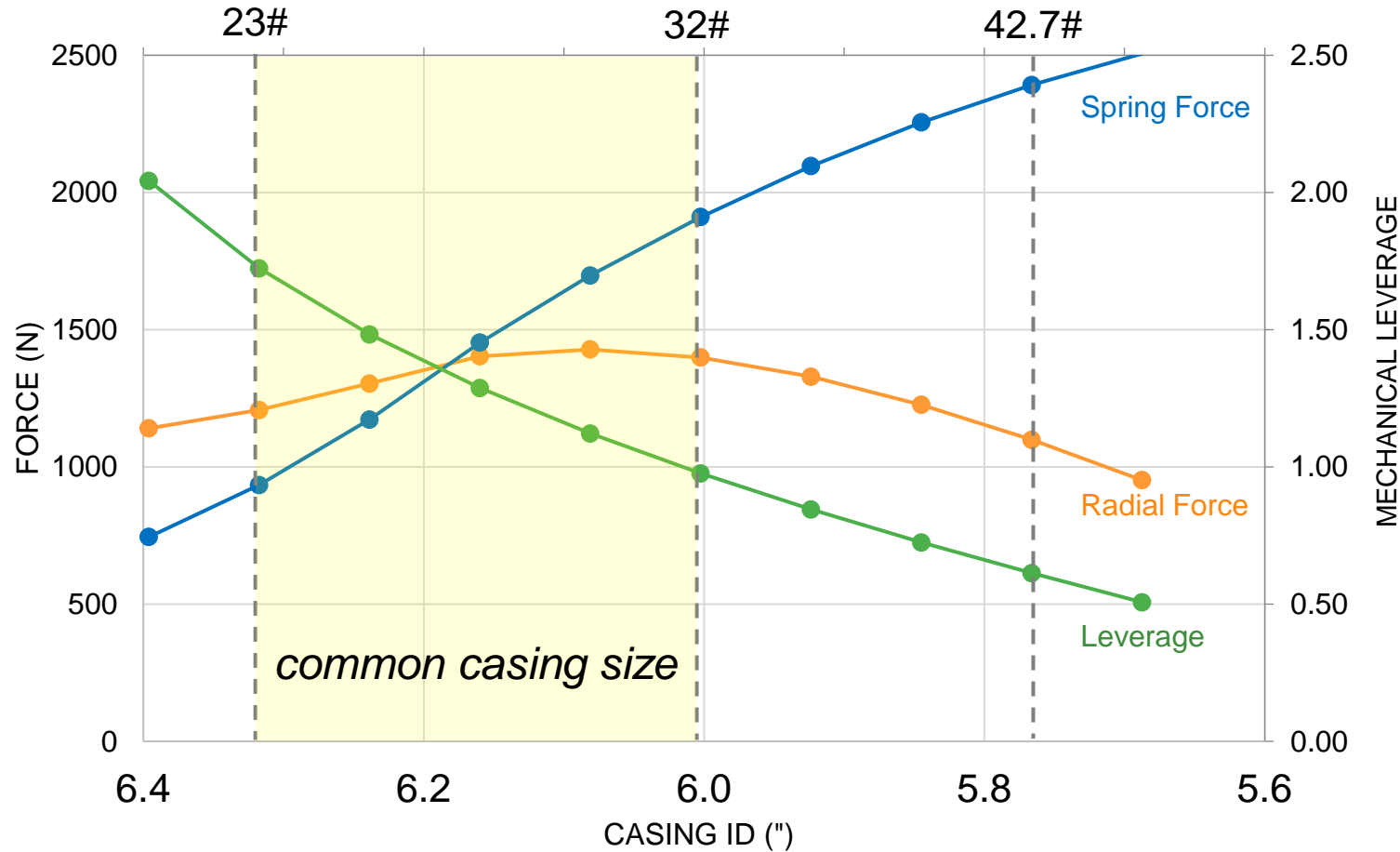


Ultrasonic-CBL Centralization: 7"



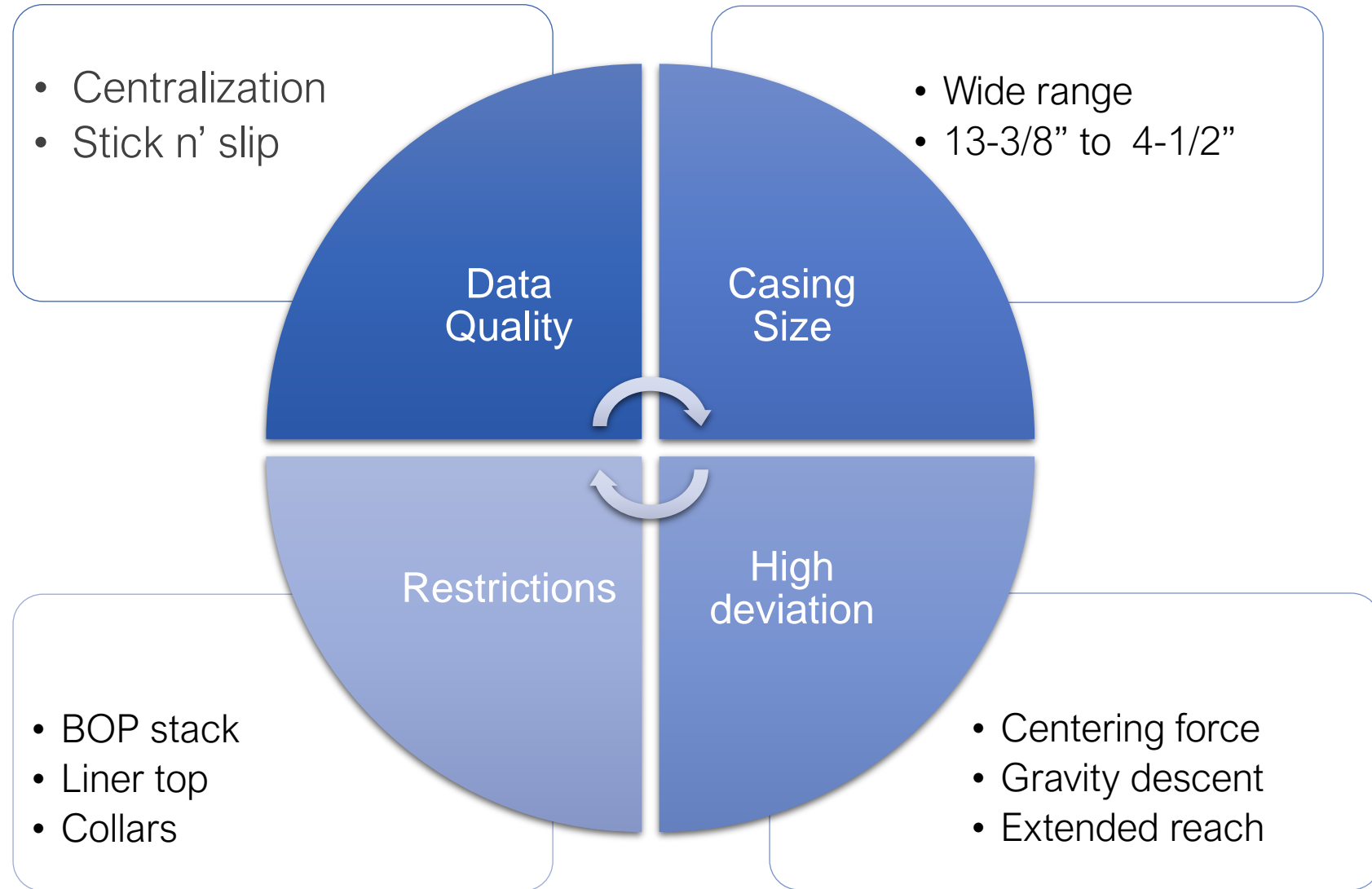
*Collapsible Standoff
for 3-5/8" Tool Housing*

Ultrasonic-CBL Centralization: 7"



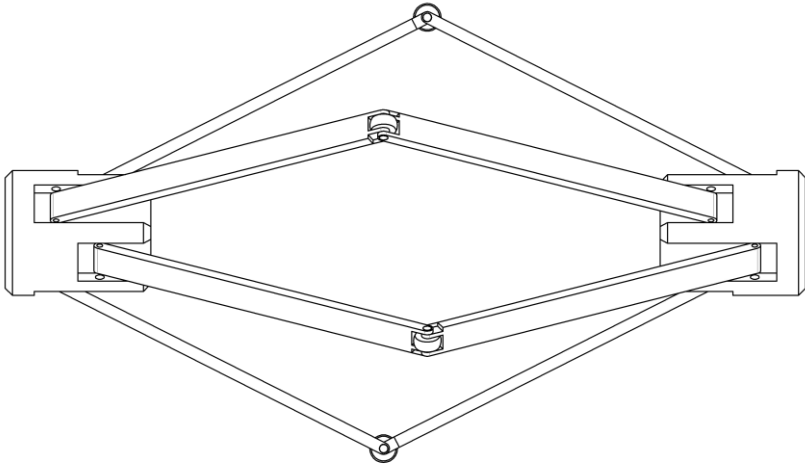
- Bespoke Centralizer for 7in
- Carry 260lbs ea.
- Compact
 - 13lbs, 9.7in
 - Fits between Tx & Rx
- No casing collar holdup
- Low Friction Bearings (<5%)
- Easy adjustment & maintenance

Ultrasonic log Challenges

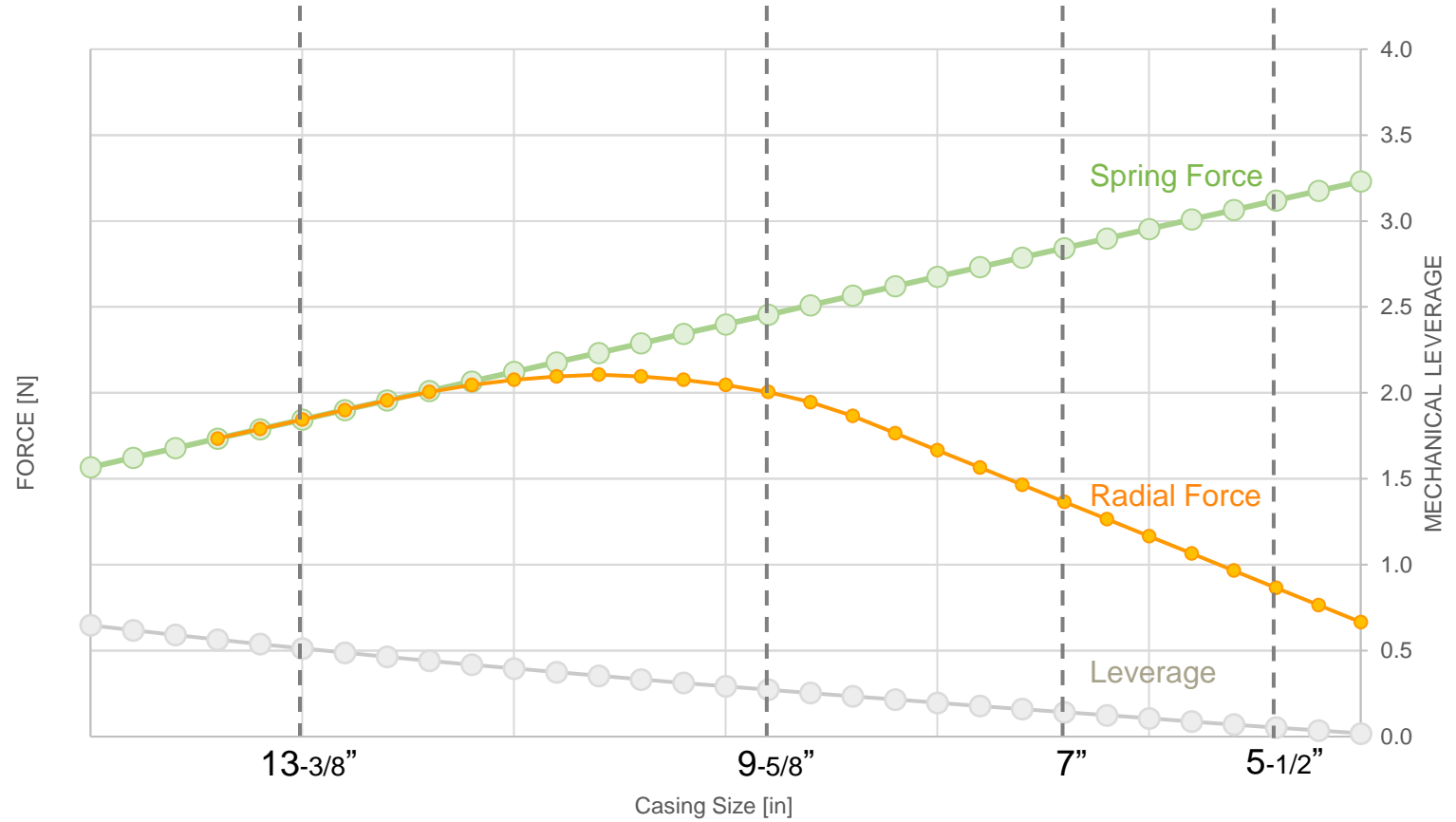
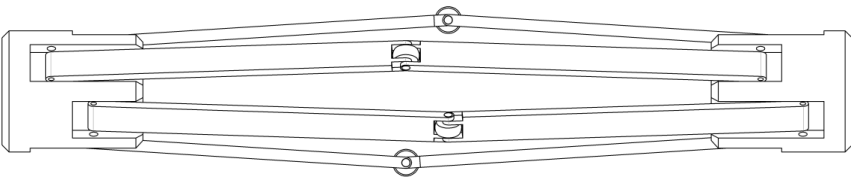


Legacy Centralization Mechanism

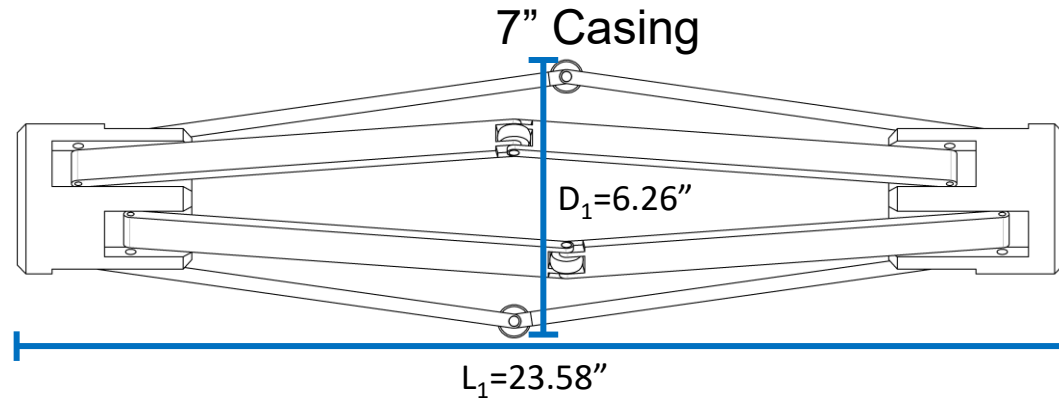
13-3/8 Casing



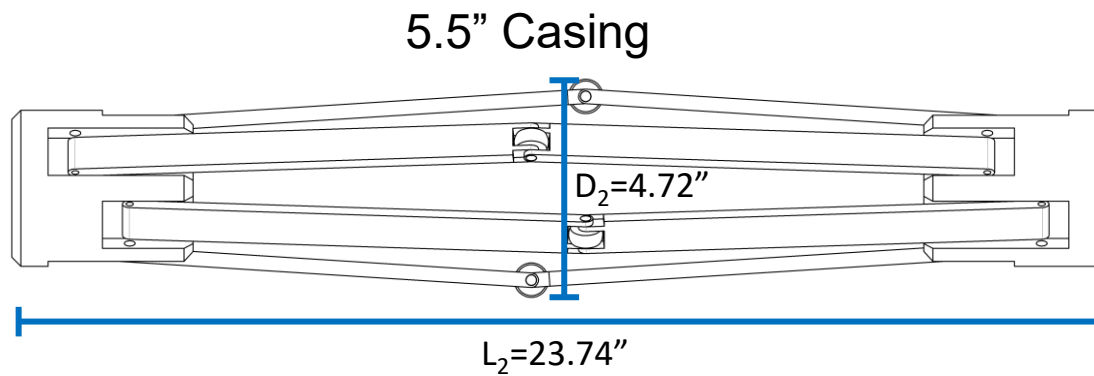
5.5in Casing



Mechanism Inefficiency in small casings

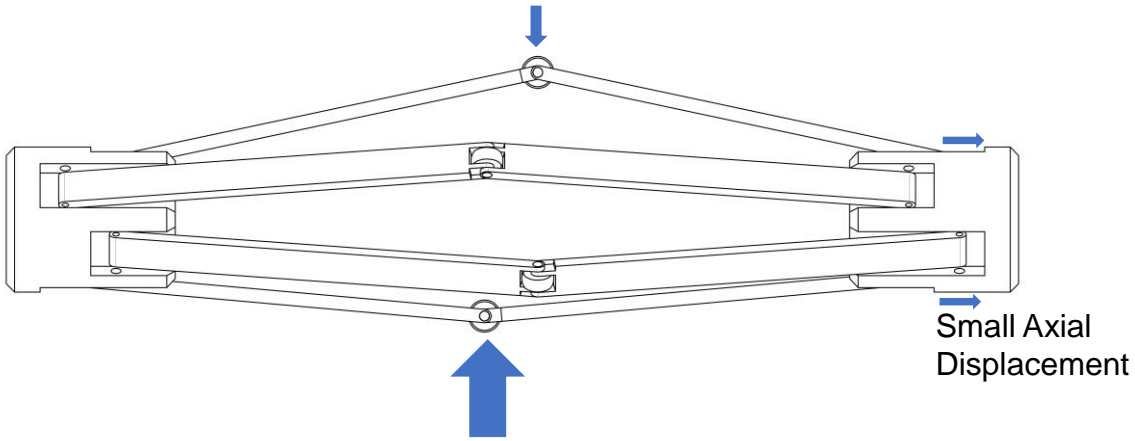


$$\frac{\Delta l}{\Delta d} = \frac{0.16}{1.54}$$



$$\frac{\Delta l}{\Delta d} = 10\%$$

Mechanism Inefficiency in small casings

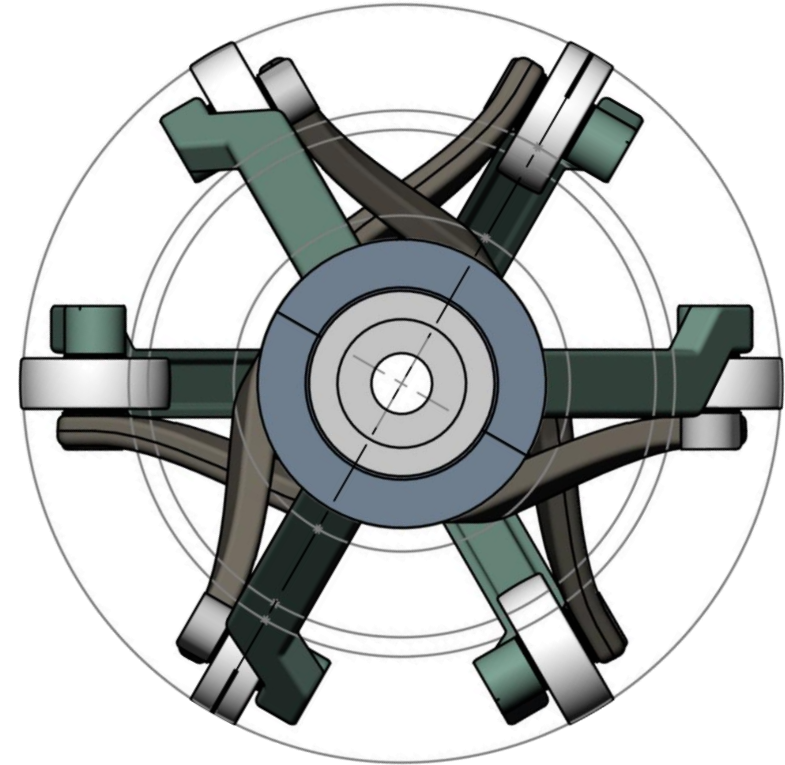
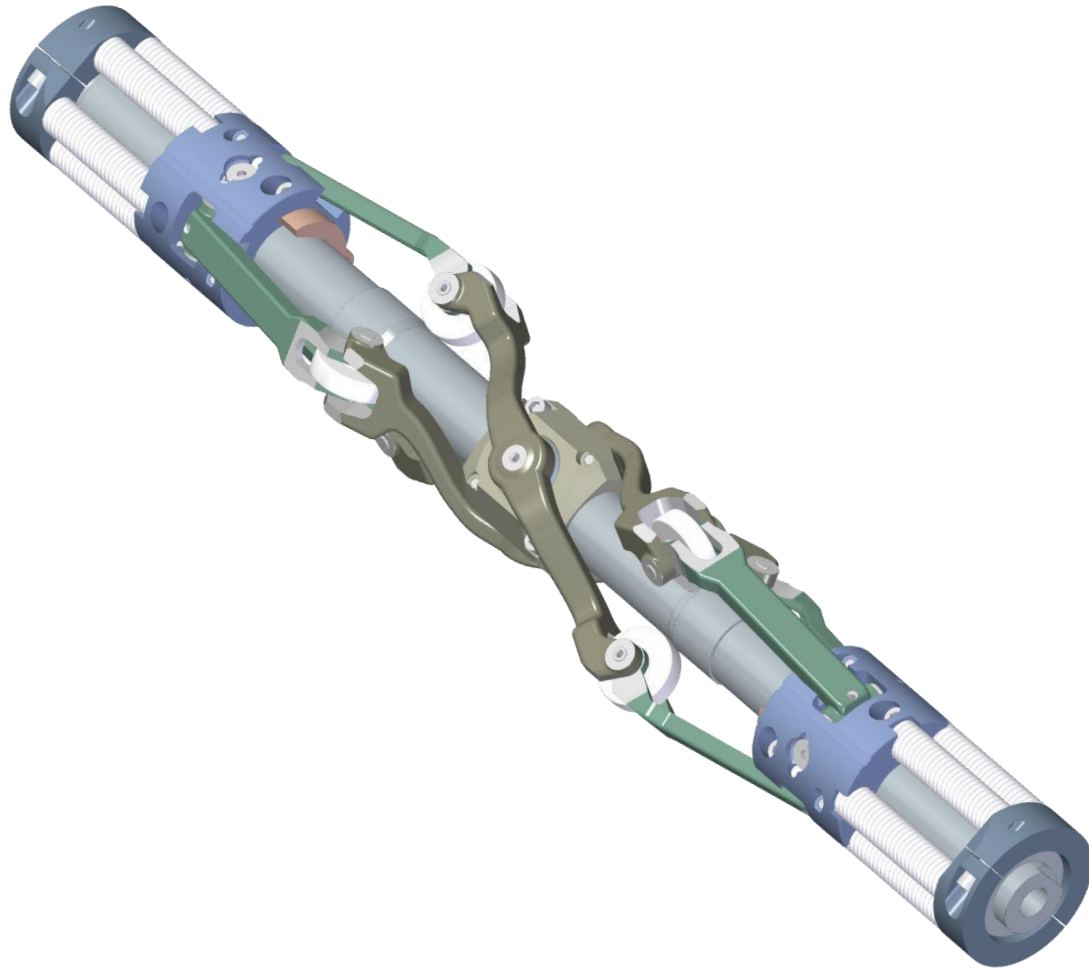


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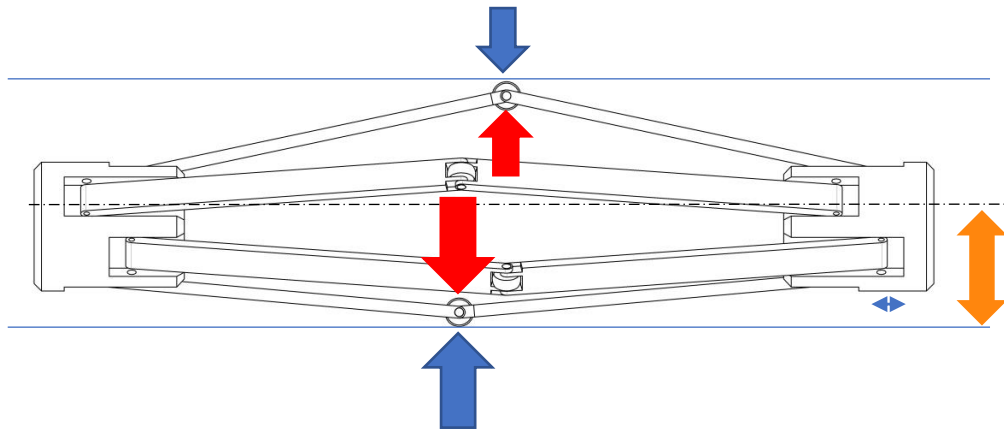
Leaf springs function independently

Rocker Centralizer: 9-5/8 to 4-1/2"



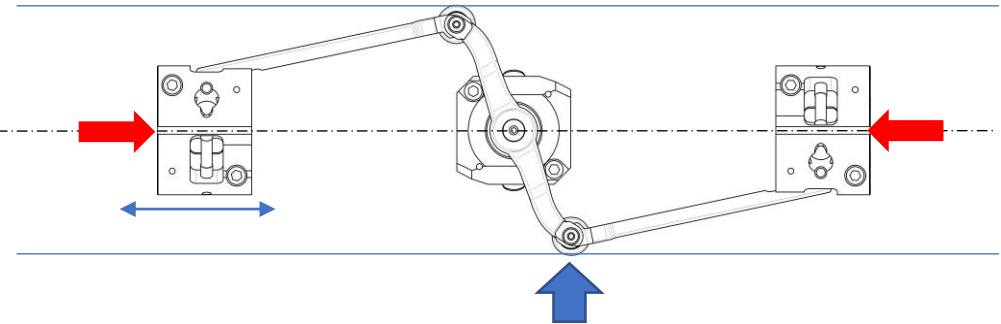
Rocker Centralizer: DIRECT

INEFFICIENT
Linkage Centraliser



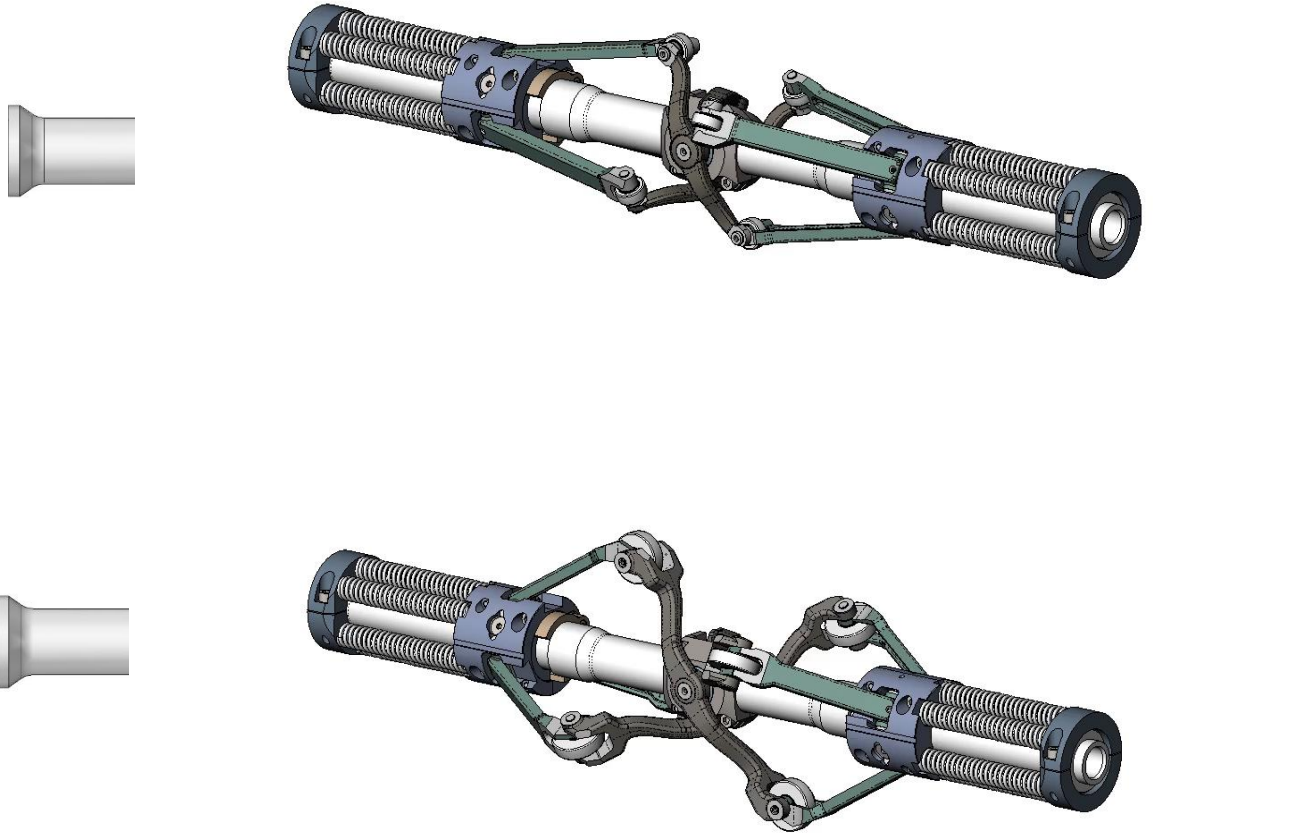
Mechanism fails in small hole

DIRECT
Rocker Centraliser



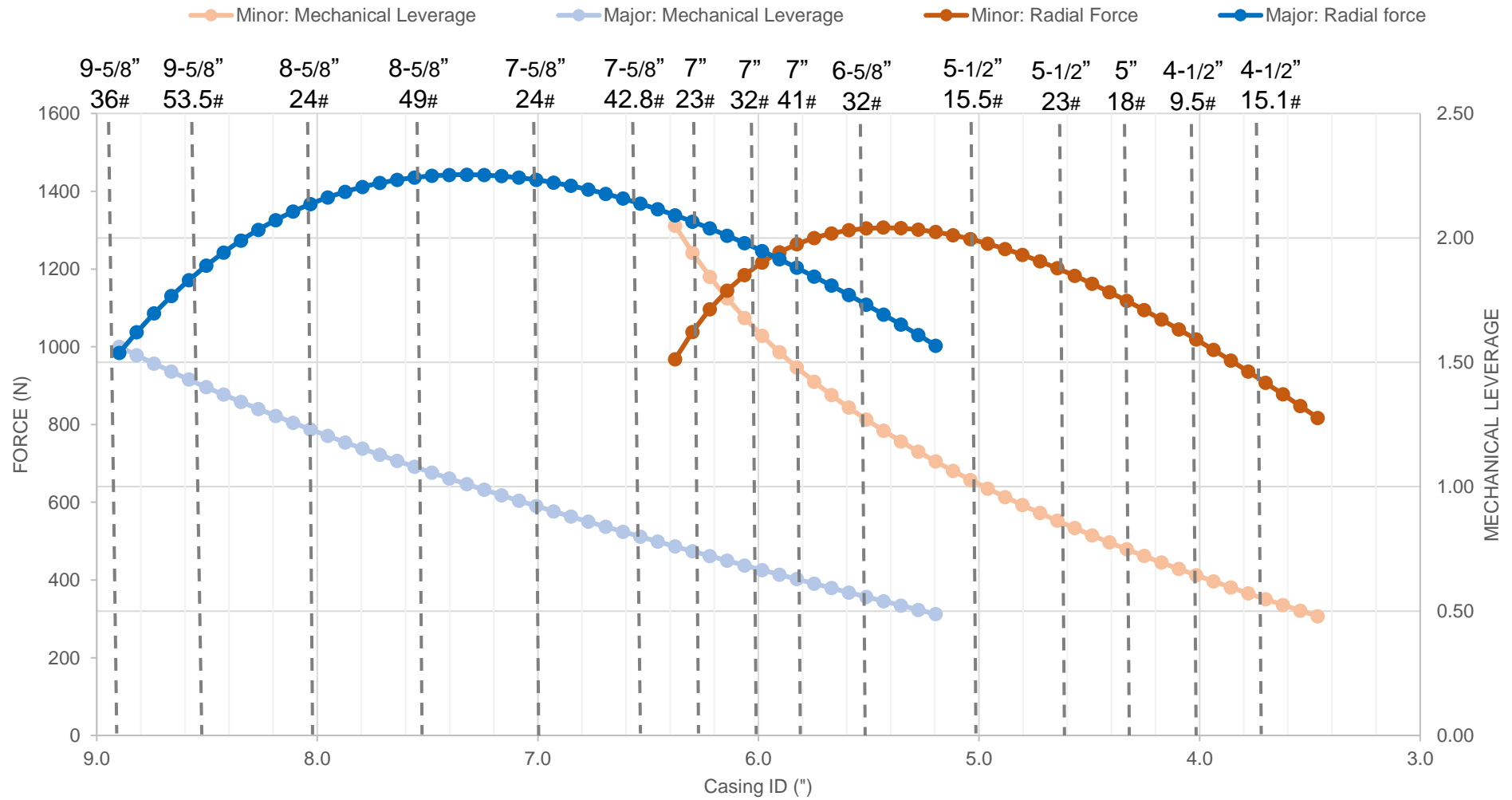
Perfect centralisation

Rocker Centralizer: 9-5/8 to 4-1/2"

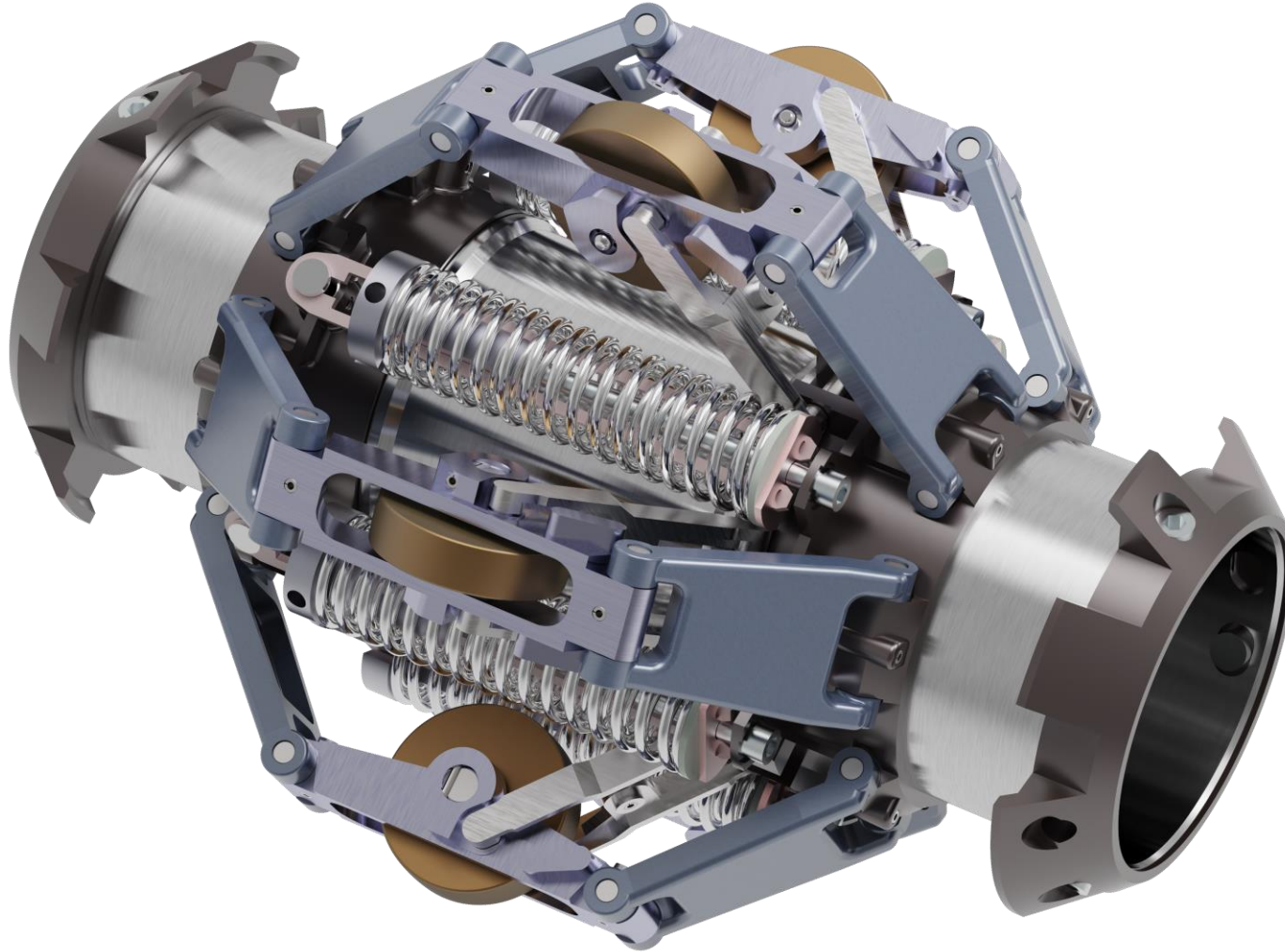


- ALL casings 9-5/8 to 4-1/2"
- Carry 260lbs (horizontal wells)
- Quick & easy setup
 - 10mins to swap out size range
 - No booster kit or spring changes
- Tungsten Carbide Bearings (<5%)
 - Low Rolling Friction, < 5%
 - Wear Resistant
- Rocker ensures perfect centralization

Radial Force range

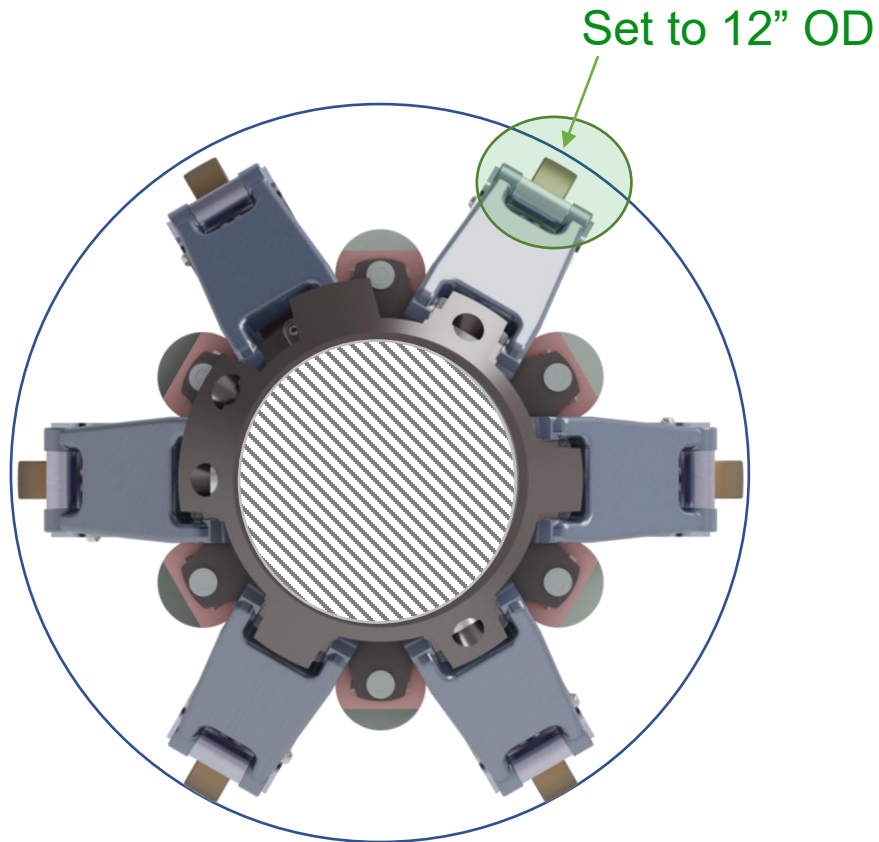


Centering Roller for 12 ¼ Open-Hole: CP12



*Designed for heavy
Imaging, Sonic
& Fluid Sampling Tools*

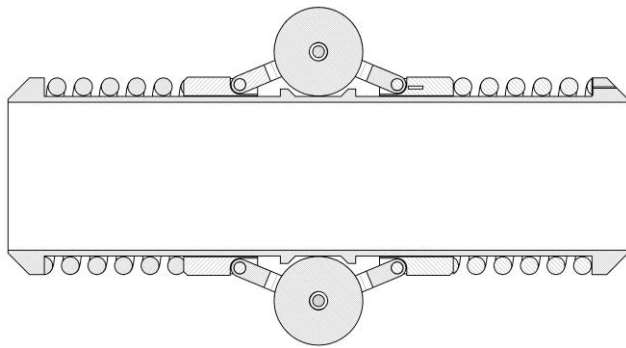
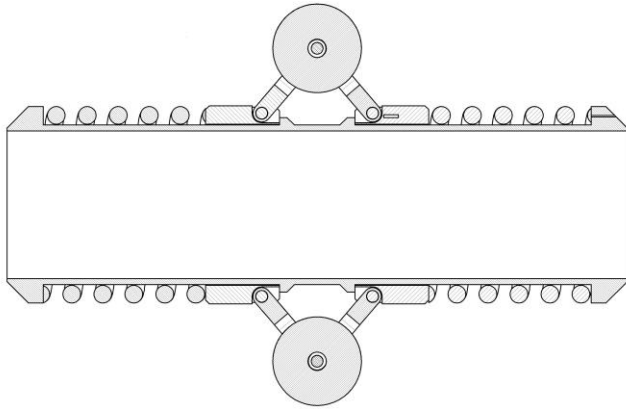
CP12: Maximum OD Setting



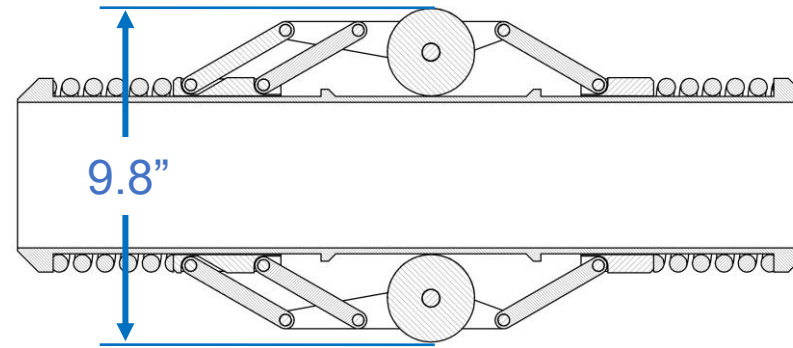
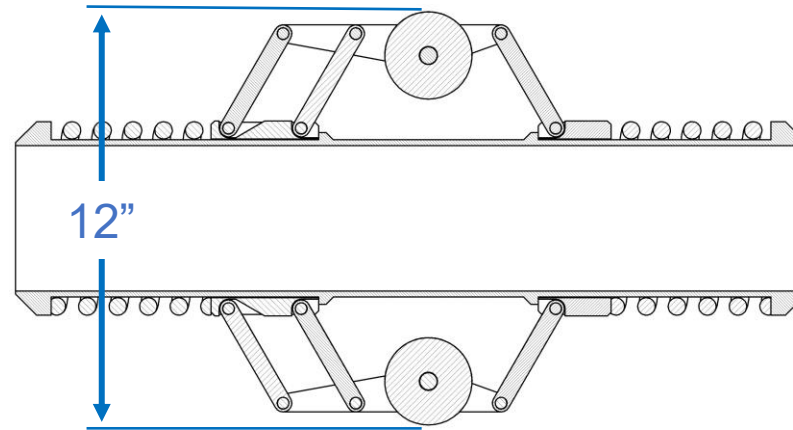
- Maximum OD 12in
- Eliminates drag from spring force
- Eliminates Stick-Slip

CP12: Large Diameter 2 1/2" wheels

Conventional

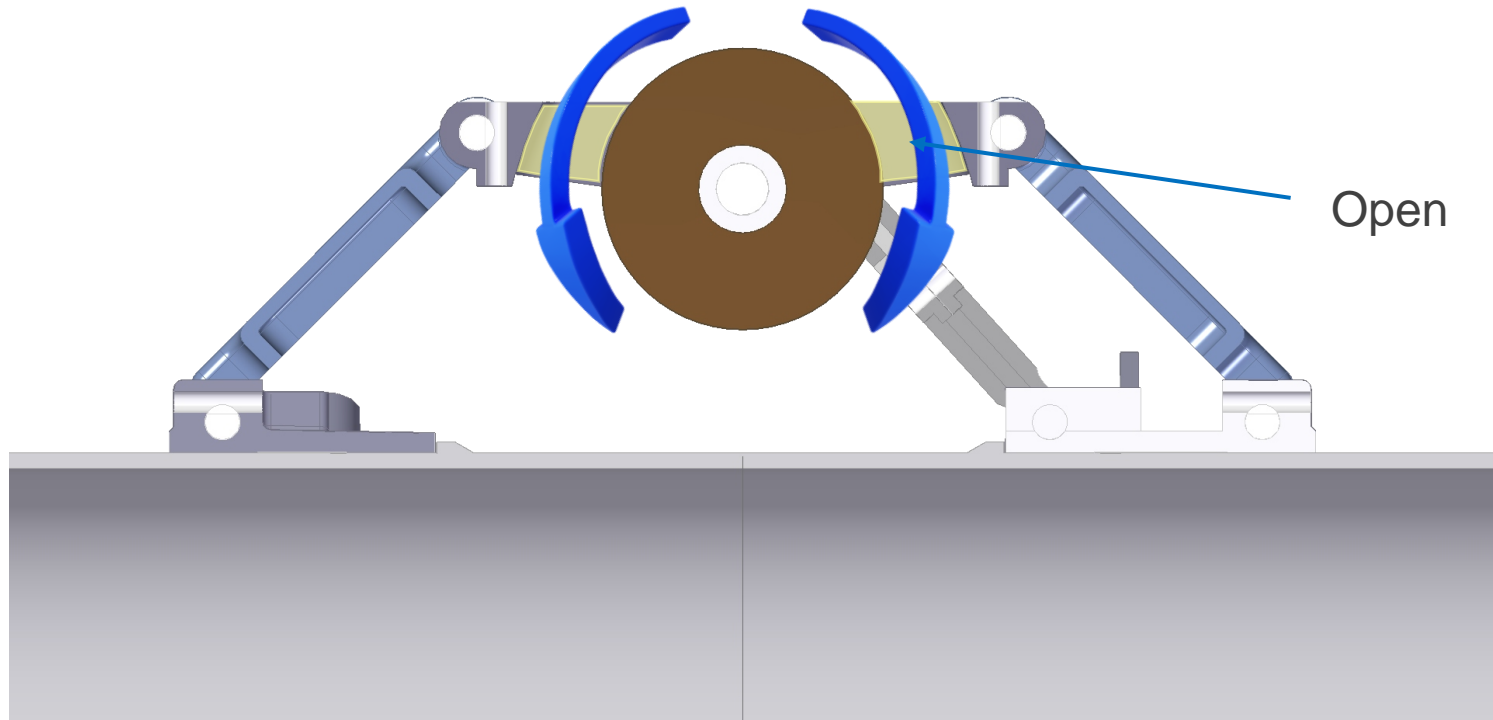


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- Large diameter wheels
- Bearing technology
- Protected casing re-entry

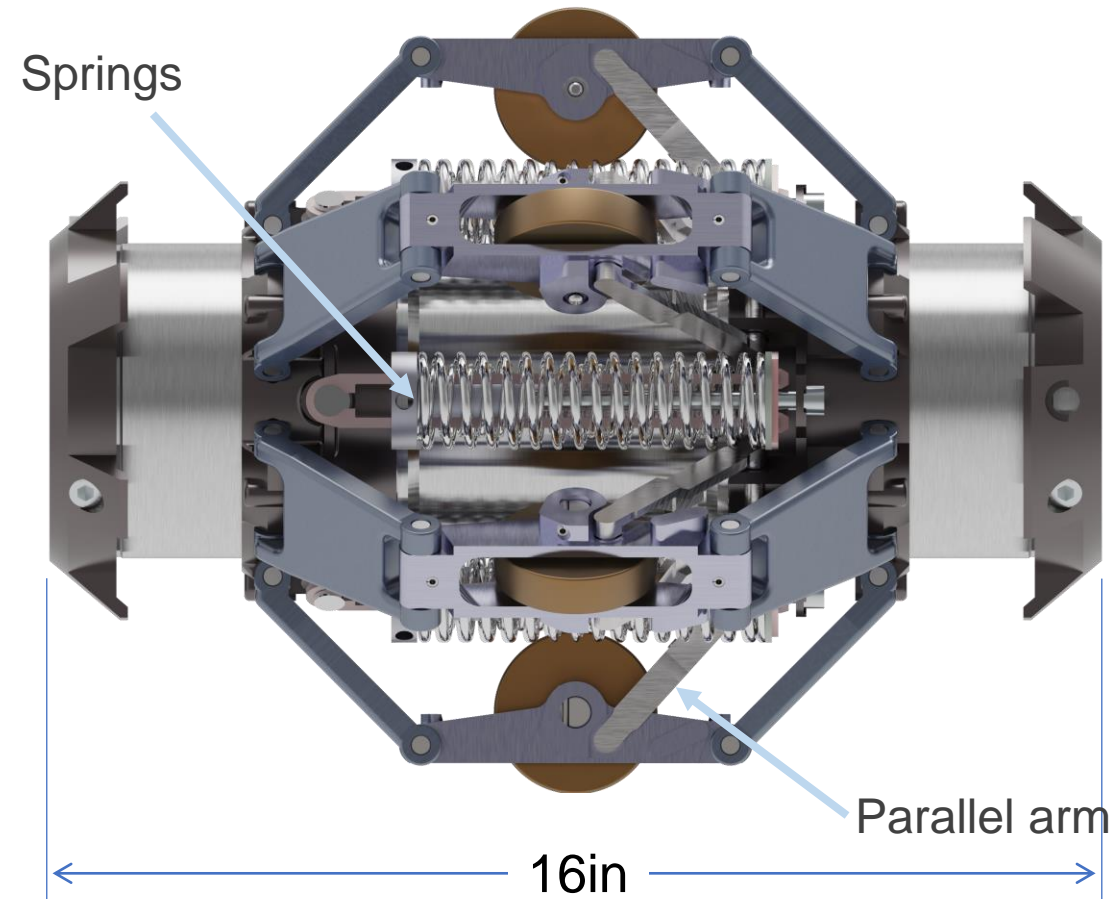
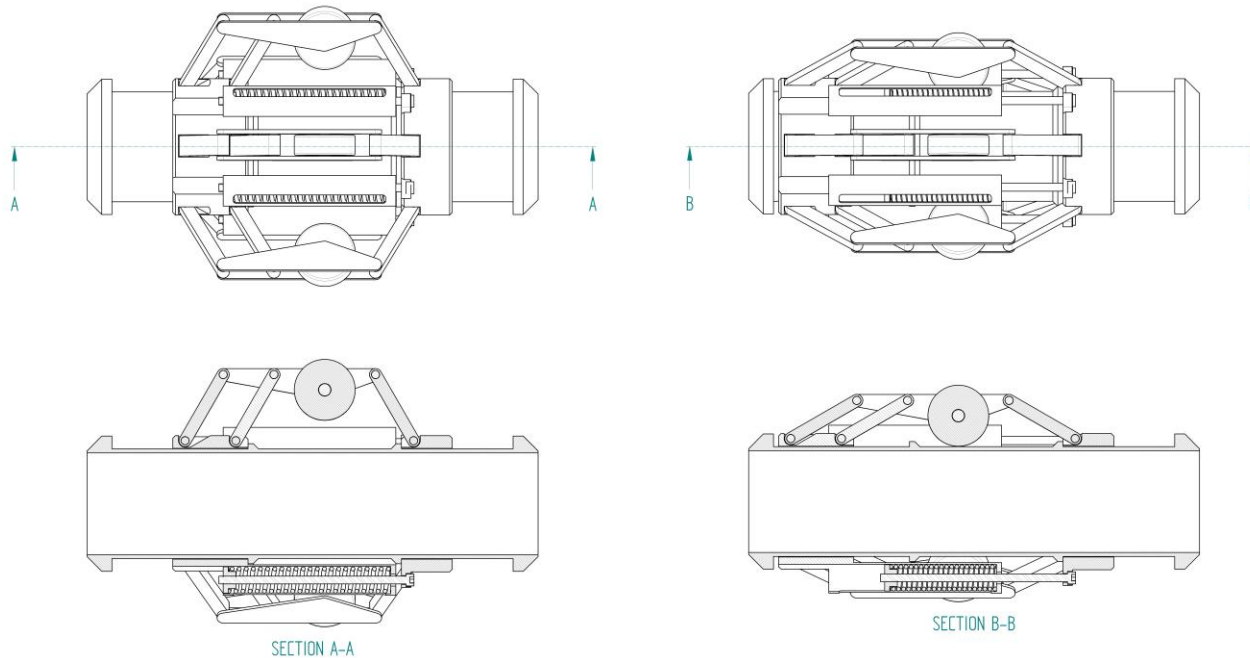
CP12: Open structure



- Open-Hole Centralizer
- No Jamming Design

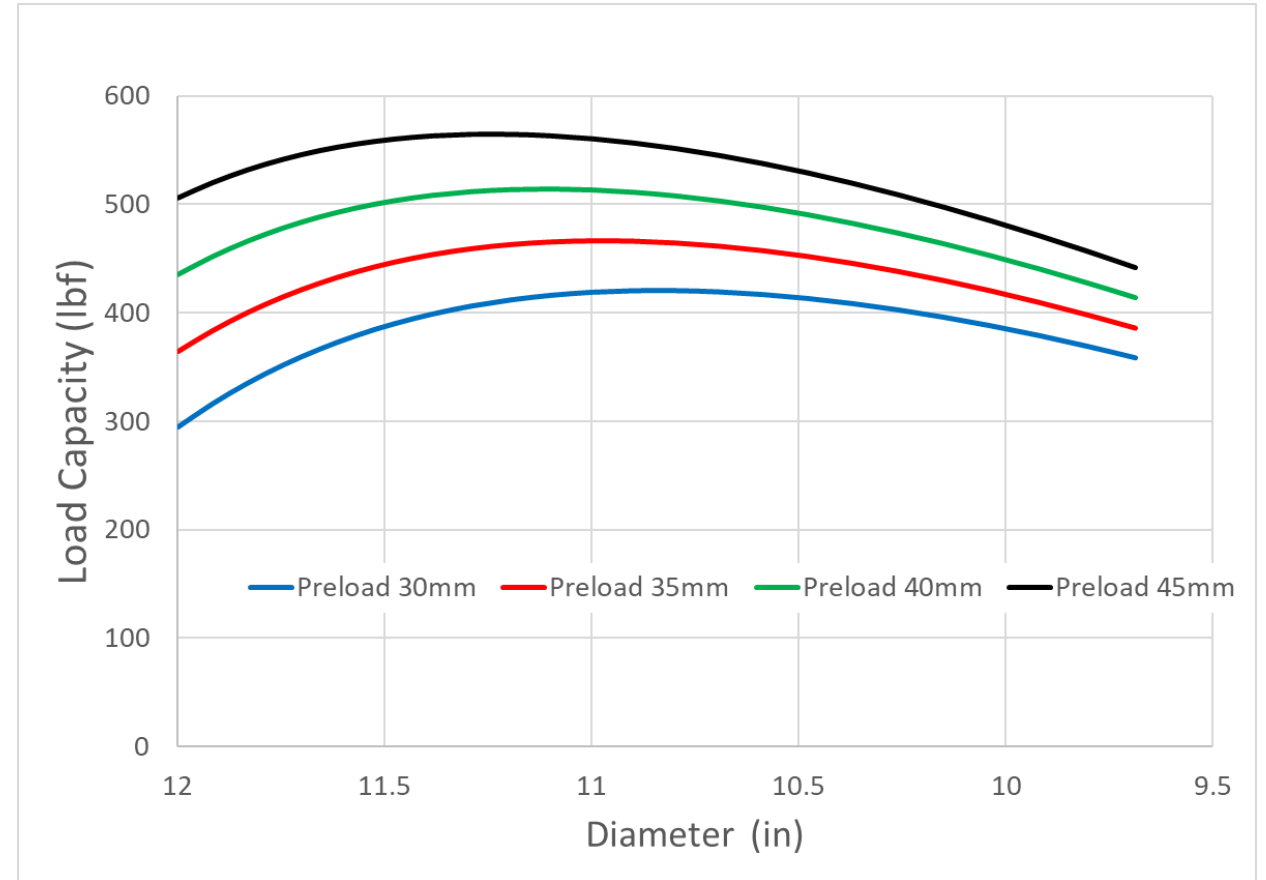
CP12: High Load Capacity

- Lightweight (45lbs)
- Compact (16in)
- Springs between arms
 - Springs work in Compression
 - Mechanism in Tension

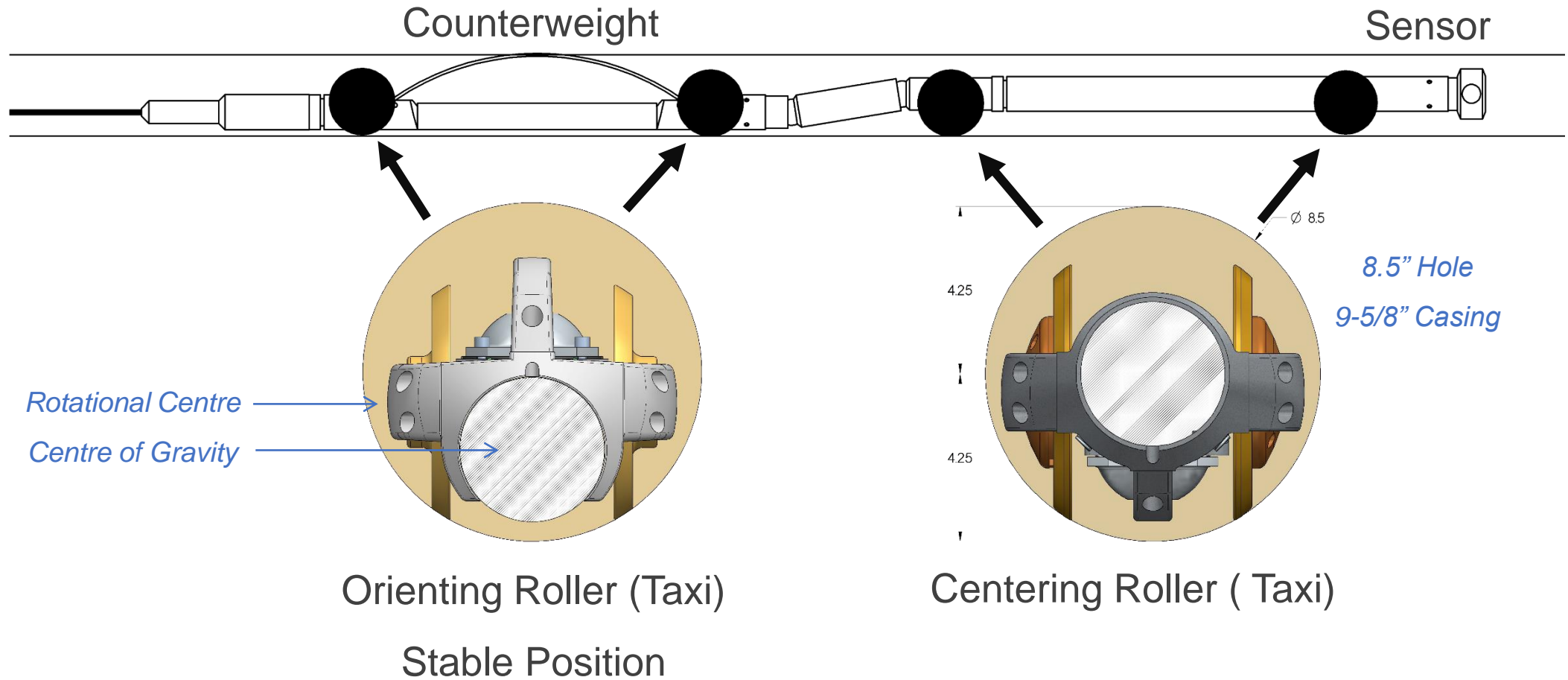


CP12: High Load Capacity

- Optimized arm Mechanism and Spring
- 500lbs max load
- Adjustable capacity
 - +250 to +450lbs

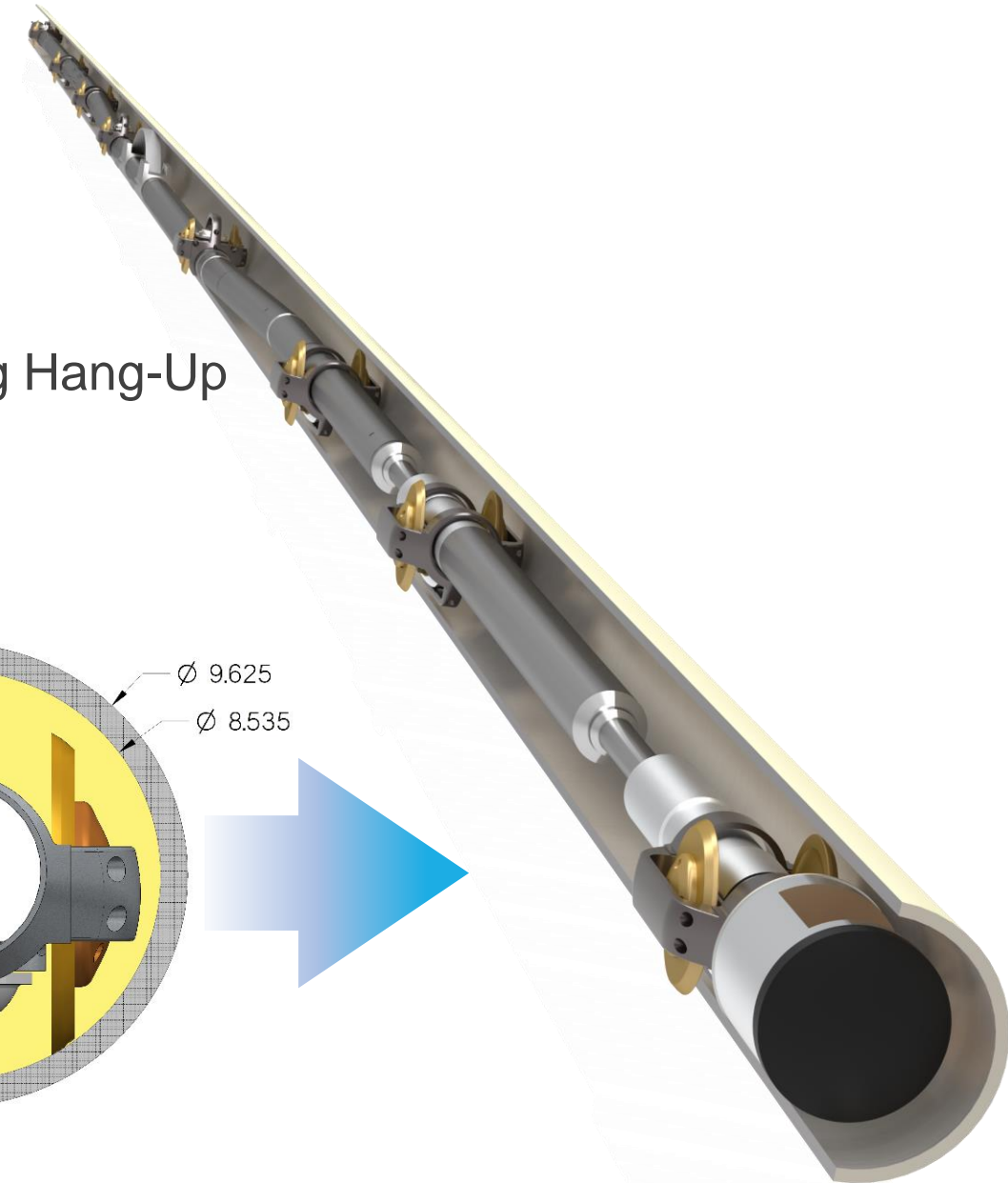
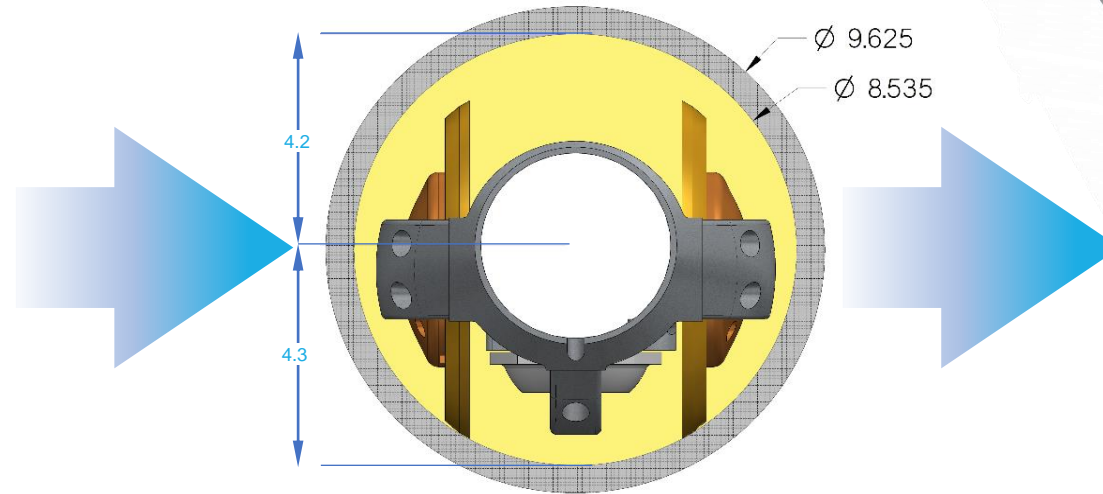
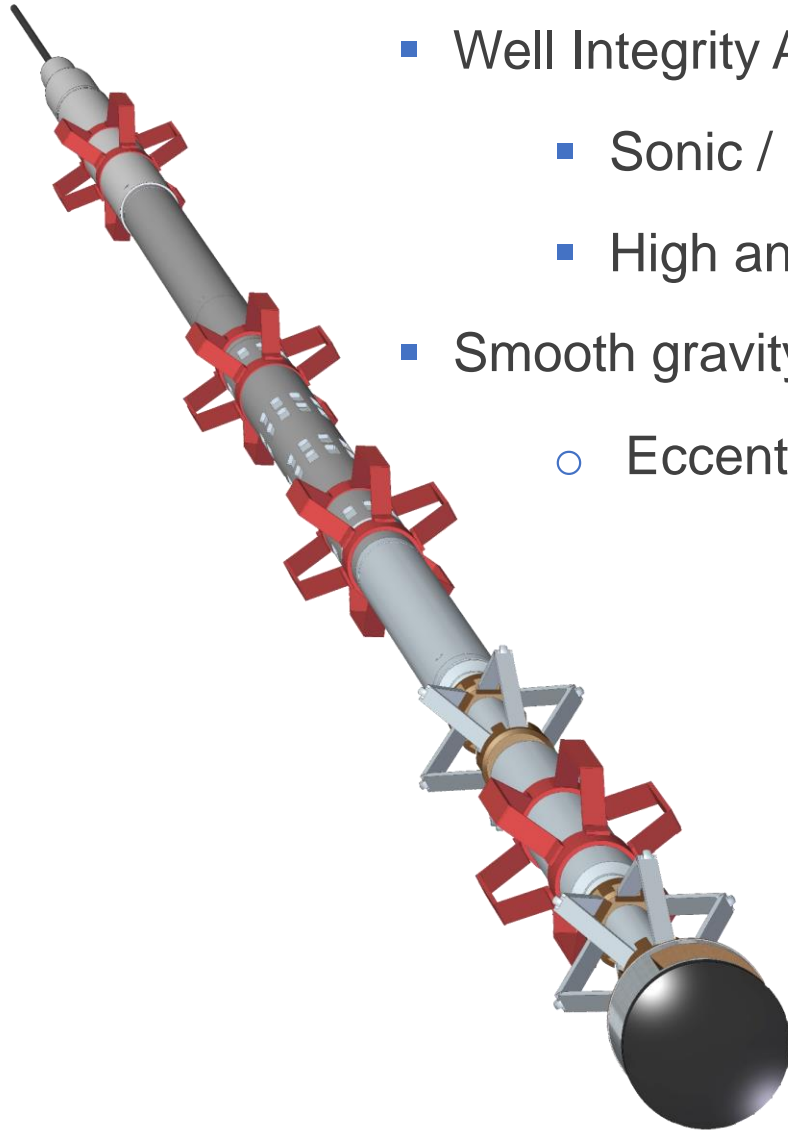


Centralization by Standoff



Centralization by Standoff

- Well Integrity Applications:
 - Sonic / Ultrasonic tools
 - High angle, Centering, BOP/Casing Hang-Up
- Smooth gravity descent to 86°:
 - Eccentralization <math>< 0.1''</math>





Thank you

¿QUESTIONS?