QUALITY PARTS & SERVICE SINCE 1947

LINER OVERVIEW
1947 FOUNDED - DESIGN OF THE FIRST BONDED PISTON
1974 INTRODUCED TWO PIECE L-SHAPED FLUID END
1988 INTRODUCED THE DUAL-DURO PISTON
1996 INTRODUCED CERAMIC LINERS
2000 INTRODUCED ZIRCONIA LINERS
2010 LASER ALIGNMENT SYSTEMS, F.E. INSPECTIONS OFFERING
2012 HIGH TEMPERATURE PISTON DEVELOPMENT & TESTING
2013 INTRODUCING MODULE SERVICE TOOL KITS / FRAC PUMP CONSUMABLE R & D
• In house manufacture of Grayloy liners since the 1970’s
• We offer a wide array of sizes for every major fluid-end manufacture
• Grayloy liners feature an inner sleeve based on ASTM A532 high chrome cast iron.
• Surface hardness is 59 – 62 HRc for abrasion resistance.
• Sleeves are shrink fitted to carbon steel outer hulls using an induction heating system.
• Inner diameter of liners are honed to an 8 to 16 RMS finish.
• Liners are shipped in wood crates and are coated with a metal preservative to prevent corrosion during shipping and storage.
What is Zirconia?

- Its great hardness, low reactivity, and high melting point have made it the oldest mineral that can be found on earth.

- Zirconium Dioxide (ZrO₂), also known as zirconia is a white crystalline oxide of the element zirconium (Zr).

- Exists naturally as the mineral Baddeleyite.

- One of the most studied ceramic materials.
Zirconia Case Study

- Conducted four year case study and collected over 12,000 pumping hours

- Pumps using Chromium Liners had expendable cost of $47,000 vs. $11,000 for Zirconia Liners

- Pump shutdowns were 4x higher (8 vs. 32) in chromium pumps compared to Zirconia

- Zirconia lined pumps used approximately 1/5 of the pistons compared to chromium lined pumps
Zirconia Liners

Zirconia Benefits

- Ceramic Liners outperform steel Liners
- Zirconia is significantly stronger and tougher than Alumina in bending or tension, often by a factor of 4 or more
- Does not require self aligning piston rods
- Extended Life and less wear reduces overall expendable cost
- Traditional liner hourly cost is approximately $1.05 per hour, while Zirconia Liners are approximately $.23 per hour
THANK YOU