

CRAMIC LINER

BENEFITS

Increased Liner Life / Lower Operating Cost per hour, traditional liner hourly cost is approximately **\$1.00 per hour**, while Zirconia Liners are approximately **\$0.20 per hour**

- Reduced Expendable Cost due to less wear and extended life
- Reduced Equipment Downtime and Maintenance, and also does not require self-aligning piston rods
- Reduced HSE Risk due to decreased frequency of liner change outs



MAINTENANCE

In order to achieve maximum run times for Zirconia liners it is critical to rotate the liner **1/4 turn** after every **800 – 1000 hours** of operation and each liner washer should have a minimum flow of 15 gallons per minute. Additionally, the liner gasket should also be changed when performing routine maintenance.

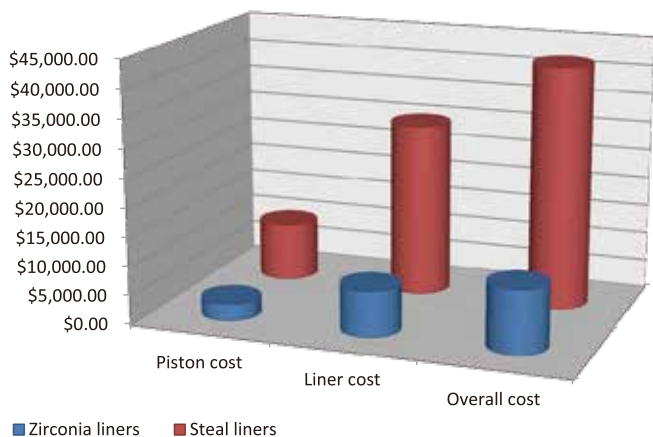


CHROME LINERS

Manufacturing of Chrome liners since 2008

- The common liner sizes available for every major fluid end.
- Chrome liners feature an inner sleeve based on ASTM A532 high chrome cast iron.
- Surface hardness is more than 60 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 4 to 8 RMS finish.
- Liners are shipped in steel crates and are coated with a metal preservative to prevent corrosion during shipping and storage.

PERFORMANCE



COST COMPARISON BETWEEN CERAMIC LINERS AND CHROME LINERS

Collecting Testing data shows over 12,500 pumping hours

- Pumps using Chromium Liners had much expendable cost than Zirconia Liners.
- Pump shutdowns were 4x higher in chromium pumps compared to Zirconia.
- Zirconia lined pumps used approximately 20% of the pistons compared to chromium lined pumps.