

TITANIUM DIFFUSION HARDENING

Hardens titanium to a greater depth than alternative processes, providing exceptional wear resistance characteristics and improved durability against abrasion and friction.



TDH™ Basics

- TDH™ is a unique diffusion-based case hardening process for titanium alloys
 - ▶ Designed to improve the wear & friction properties of titanium alloys in dynamic systems
 - ▶ Thermally-effected in a controlled atmosphere
 - ▶ Not a superficial coating
 - ▶ Hardest at outer surface, gradual hardness transition down to core hardness moving inward
 - R_c 60+ hardness at the surface
- No Line-of-Sight processing constraints
- Significant affected case depth (up to .010"/250 microns)
- Readily finished to an Ra 4-8 μ -in finish



All Stainless Steel
100.00 grams

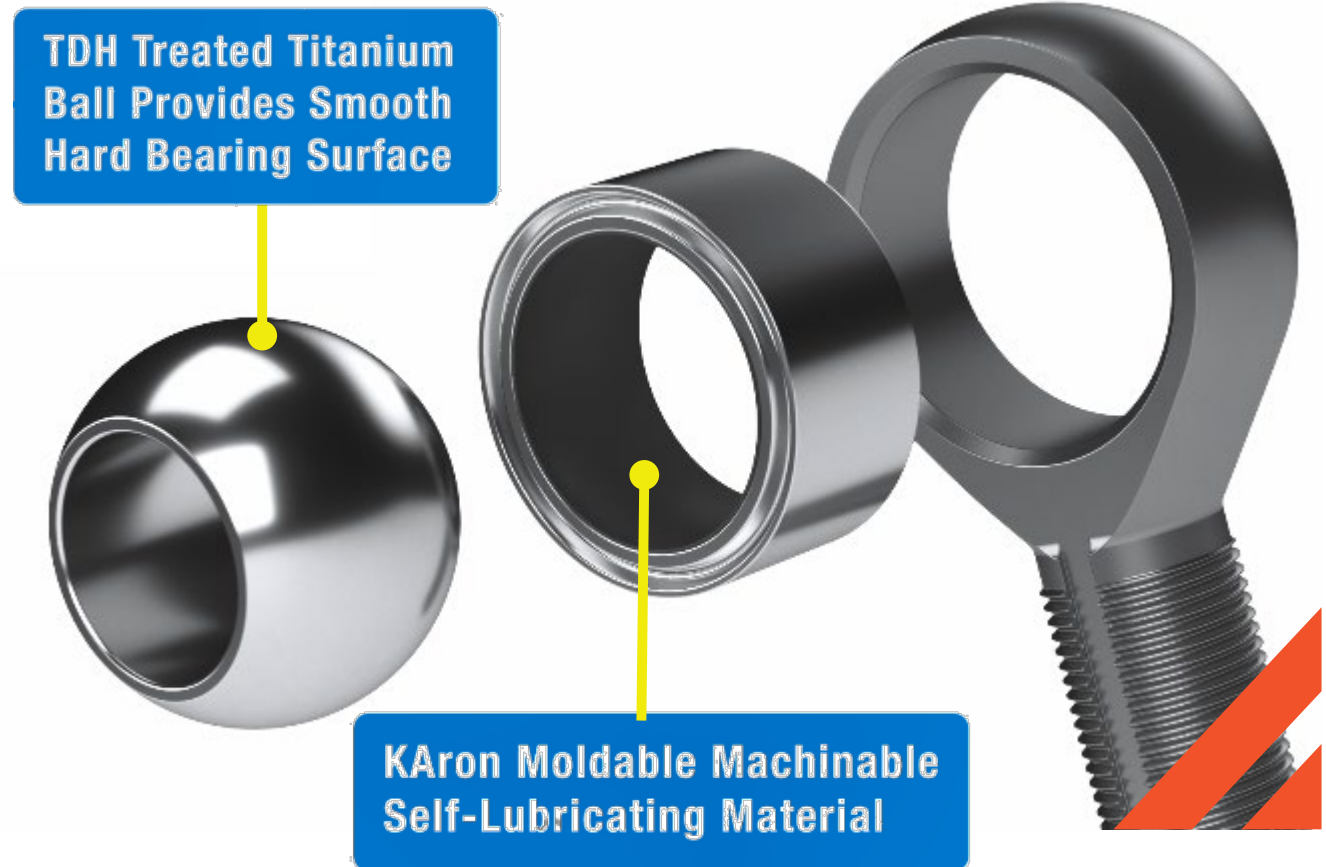


All Titanium
60.00 grams



TDH™ Basics

- TDH treated 6Al-4V serves as an excellent mating surface for Karon® self-lubricating liners
- Optimal for high-load bearing applications
 - High-hardness interface
 - Deep case depth provides foundation to react high bearing loads
 - Fine surface finish readily achieved (central to lined bearing)
- Case-hardened substrate, not a coating





TDH™ Basics

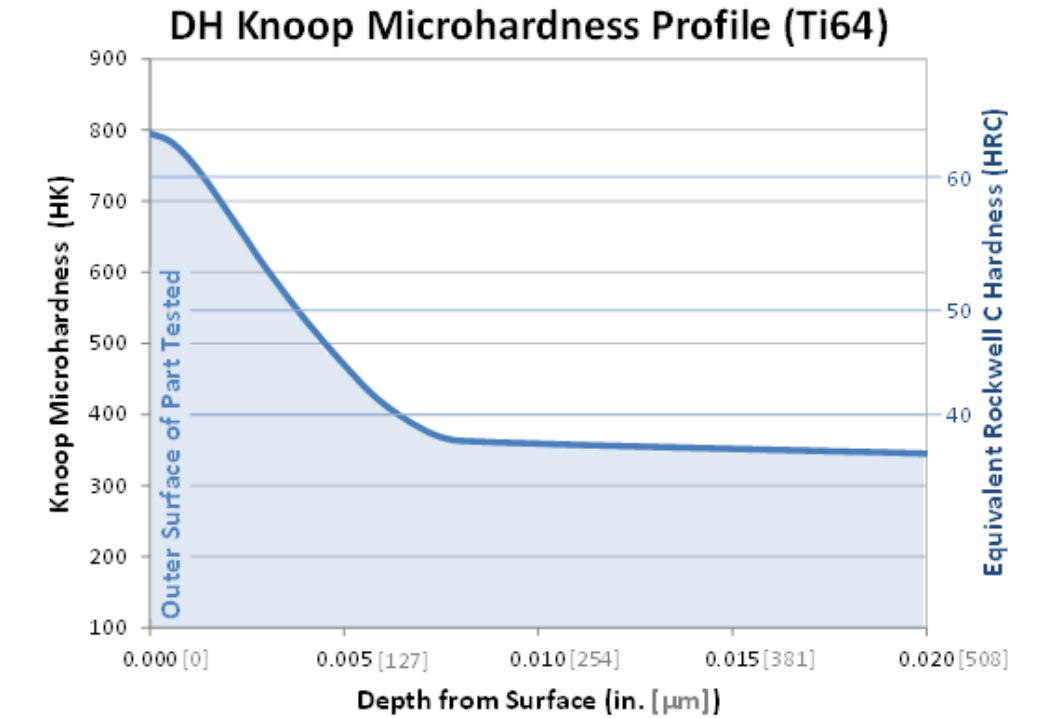


TDH™-Treated Ti64 Sleeve
Condition after testing¹
100K Cycles, .0004"/10
Microns Wear



Standard Age-Hardened
(STA) Ti64 Sleeve
Condition after testing¹
8K Cycles, .0122"/300
Microns Wear (Stopped)

¹ Room Temp AS81934 Oscillation Under
Radial Load Test (all samples), tested against
Karon B lined bushing at 33ksi [228 Mpa]
±25° 20 cpm



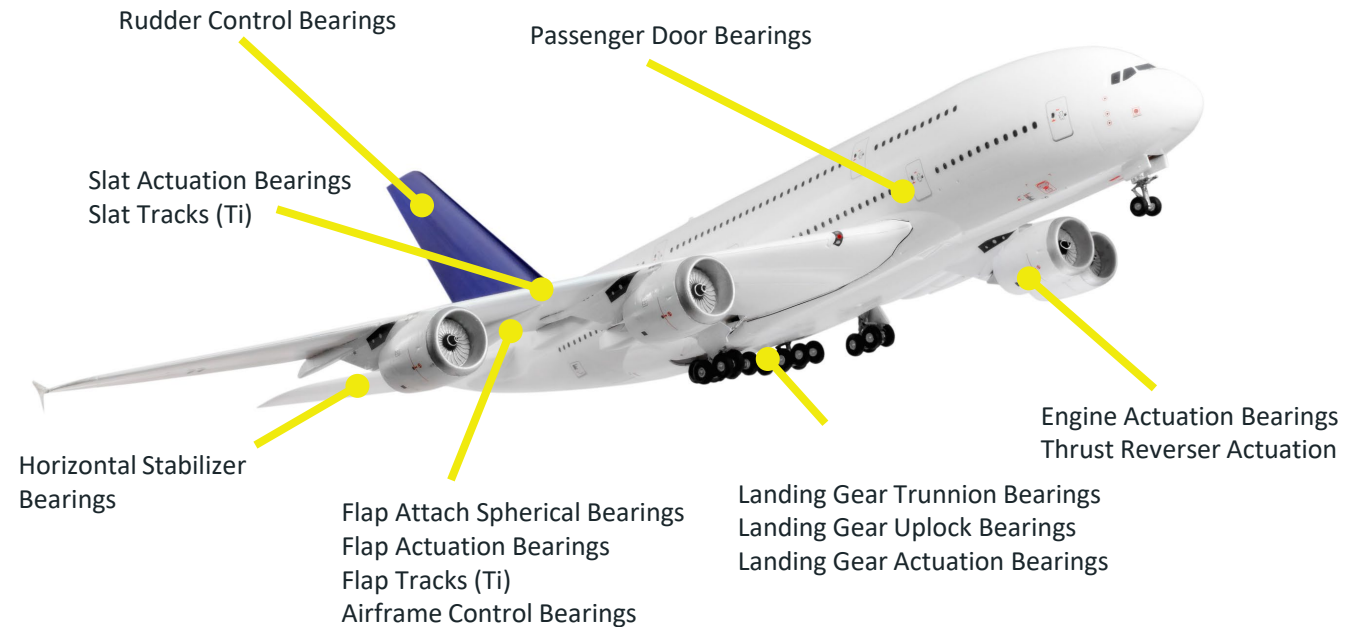
Market – Rotor/Helicopter

- Lightweight
- Corrosion Resistant
- Complies with Environmental regulations
- Resists debris
- Long life



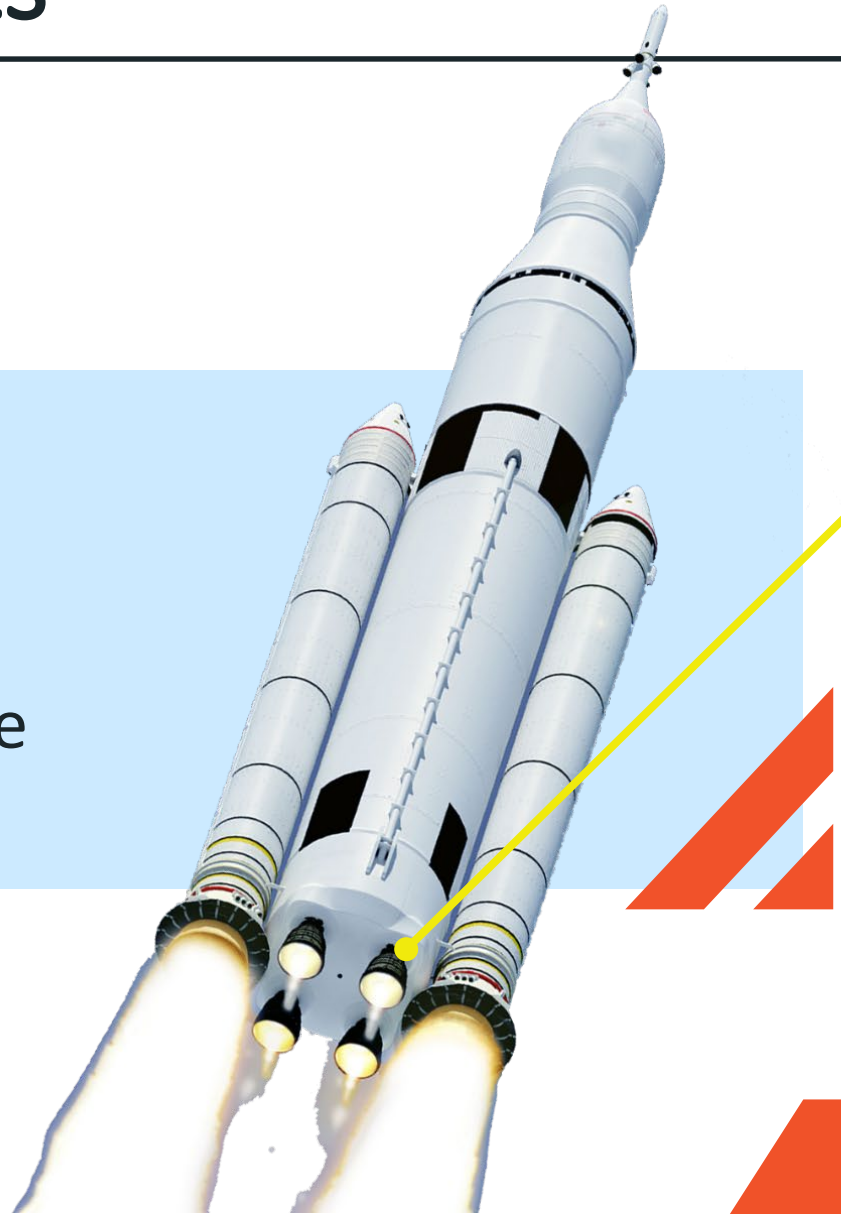
Market – Fixed Wing

- Lightweight
- Corrosion Resistant
- Complies with Environmental regulations
- Long life



Market - Rockets

- Lightweight
- Corrosion Resistant
- Complies with Environmental regulations
- Resists fretting damage
- Long life



Control Surface Actuation Bearings
Thrust Gimbal Bearings
Actuation Bearings
Turbopump Bearings

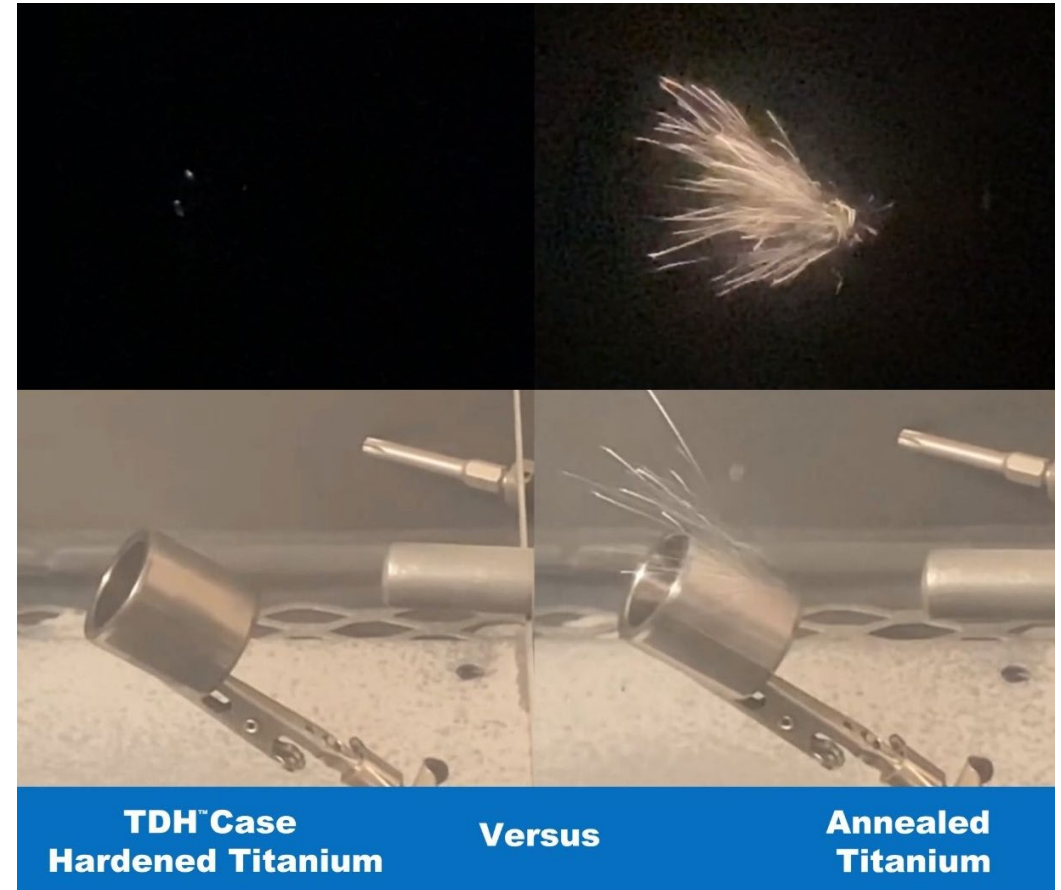
Market – Drilling/Oil Exploration

- Valves
- Erosion Control
- Corrosion Resistance
- Long Life



Market – Suppressors

- Visual signature suppression
- Lightweight
- Long life



Market – Chemical Processing

- Valves
- Erosion Control
- Corrosion Resistance
- Long life



Market – Marine

- Corrosion/salt resistance
- Extended application life for bearings and other dynamic components



Market – Medical

- Biocompatibility
- High strength-weight ratio
- Limit debris from wear (in-body)
- Devices/Surgical Instruments
- Medical robotics
- Long life

