

High-Performance Engineered Bushings and Sleeve Bearings

For more than 50 years, HEF has designed and developed high performance bushings and joints for demanding applications in industries such as construction, mining, steel processing, transportation, forestry, material handling, agriculture and others. HEF bushings are recognized world-wide for their excellent frictional and anti-seizure properties, and their ability to withstand high loads. HEF bushings are also industry's choice for applications requiring extended intervals between lubrication.

Three factors combine to give our engineered bushings exceptional serviceability for high-load/low rotational speed applications. These factors are:

- Optimum steel selection and heat treatment
- Patented surface treatments
- Patented surface topographies: ID cross-hatching & surface cavities

HEF Bushings for different operating conditions

Lubrication (greasing interval, hours)	Operating Temp	Wear Conditions	Corrosion Conditions	Loads (max. pressure MPa)	Velocity (m/s)
Regular (8-50)	Ambient	Shock	Normal	Low (<50)	Low (<1)
Frequent (50-150)	Low (<250°C)		Moist (outdoors)	Medium (50 -150)	Medium (1-5)
Periodic (150-350)	Medium (250 - 400°C)	Abrasion	Saline (on or off-shore)	High (150 -200)	High (>5)
Marginal (350-500)	High (400 - 500°C)				
Never					

Bushing Portfolio

Steel Bushings

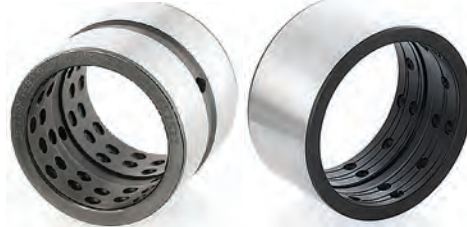
Patented designs: Interior topography designed to create grease reserves to maximize lubricant retention and allow the possibility of wear debris to be evacuated from the joint



PEL



PEL HP



PEL BH Family



PEL T

- High dynamic pressure: 100 to 250 MPa
- Greasing interval: up to 1000 hours
- Maximum speed: 1.5 M/sec (PEL T: 8 M/sec)
- Excellent abrasion resistance

Special Purpose Bushings

Fam

- Manganese steel: work hardens during usage, providing excellent wear and abrasion resistance

Tesco

- High resistance to wear and seizure at high temperatures
- Excellent Abrasion resistance

Cod 11

- Copper-Aluminum alloy
- ID Surface treatment and topography
- Excellent corrosion resistance

Composite Bushings



H Liner S



H Liner S1



H Liner M



H Liner With Lip

- The ID friction layer formed by a fine woven polymer material wound in a particular orientation to provide improved wear and fatigue resistance
- PTFE particles distributed in the resin leads to the self-lubricating properties of these bushings
- The high strength back layer is made from winded glass fiber with epoxy resin

Benefits

- Dynamic pressure: 80 to 150 MPa
- Maintenance free
- Maximum speed: 0.5 m/sec
- Excellent corrosion resistance

Construction & Mining

Applications

- Bucket linkage joints
- High-loaded joints
- Hydraulic cylinder joints
- Clamping systems
- Attachments



Grapples



Hydraulic Excavator

Operating Conditions

- Heavy loads: 100 -250 MPa
- Greasing intervals up to 500 hours (in some cases 1000 hours)
- Low & medium velocities (max. 1.5 m/sec)
- Ambient temperature
- Abrasive, shock & moist conditions



Dump Trucks



Wheel Excavator



Back Hoe



Tunneling Equipment



Mining Equipment

Steel / Non-ferrous Metal Manufacturing & Processing

Applications

- Trunnions
- Crane components
- Clamp joints
- Conveyor rollers
- Continuous casting equipment components
- Furnace door and roller components

Operating Conditions

- Heavy loads: 100-250 MPa
- Greasing intervals up to 500 hours (in some cases 1000 hours)
- Low velocities (max. 1.5 m/sec)
- Medium & high temperatures
- Moist, abrasive conditions



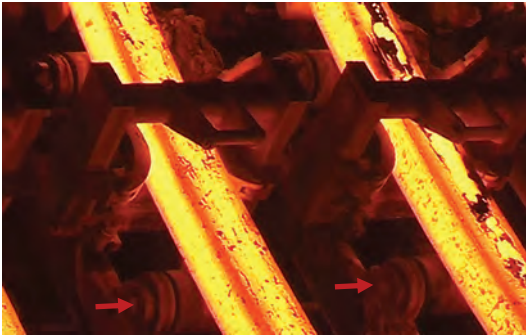
Rolling Mill Conveyor



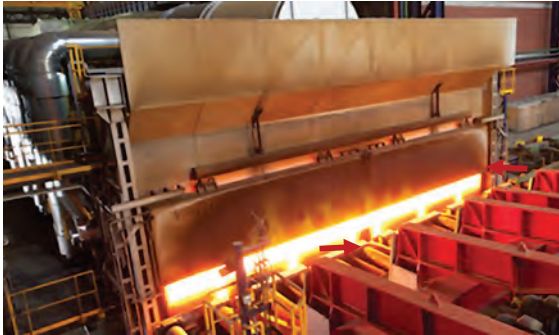
Casting Ladle



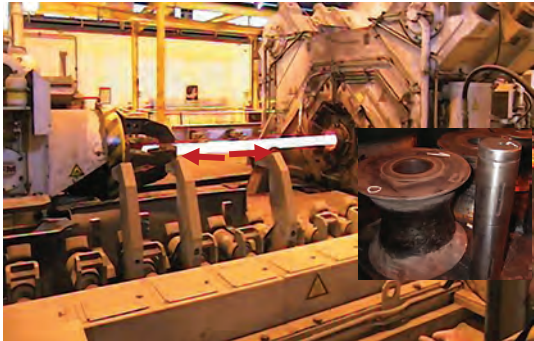
Bridge Crane



Continuous Casting Conveyor



Walking Beam Furnace



Bar Forging Mill Rollers



Clamps & Attachments

Material Handling

Applications

- Pivot joints
- Rollers
- Guiding slides
- Cylinder joints
- Attachment joints
- Pulleys



Telescopic Handlers

Operating Conditions

- Moderate loads: 50-150 MPa
- Greasing intervals up to 500 hours (in some cases 1000 hours)
- Low & medium velocities (max. 1.5 m/sec)
- Ambient temperature
- Normal & moist conditions
- Saline environment for port & off-shore



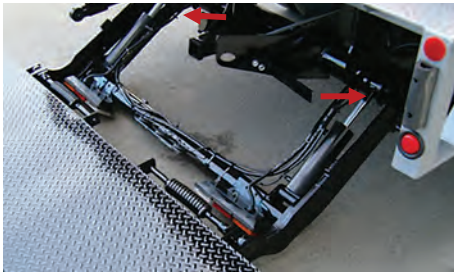
Crane



Airport Handling Equipment



Car Carrier



Tailgate



Work Lift



Hook Loader



Scissor Lift



Harbor Cranes

Agriculture & Forestry Equipment

Applications

- Linkage joints
- Hydraulic cylinder joints
- Clamping systems

Operating Conditions

- Low to loads: 50-150 MPa
- Maintenance free: no greasing preferable
- Low velocities 0.5 m/sec
- Ambient temperatures
- Moist, abrasive conditions



Disc Tillage



Disc Harrow



Ploughs



Bush Cutters



Seeder



Front Loader



Harvesting Head



Strip Tillage

Attachments

Applications

- Linkage joints
- Bucket joints
- High-loaded joints
- Hydraulic cylinder joints

Operating Conditions

- Low to heavy loads: 50-250 MPa
- Greasing intervals up to 500 hours (in some cases 1000 hours)
- Low velocities (max 1.5 m/sec)
- Ambient to low temperature
- Diverse conditions: normal, abrasive, moist, saline



Grapple



Clamshell Bucket



Buckets



Slab Clamps



Clamps



Grapple



Crushers



Harvesting Head



Hammer

HEF Bushings & Associated Products

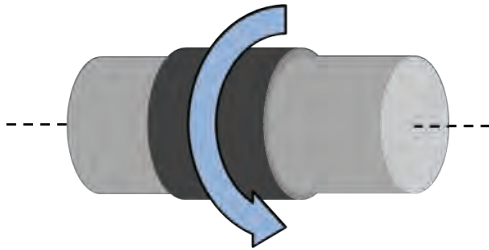


Pin

- High abrasive and adhesive wear resistance
- Ductility under flexion
- High corrosion resistance
- Low surface roughness and friction

Bushing

- High wear & abrasion resistance
- Adequate load bearing capability
- Ability to operate for long intervals without lubrication



- Technical solution for the pin will depend on the bushing selection. Usually **pin** surface hardness needs to be higher than that of the **bushing**
- **HEF pins** are designed for specific operating conditions and are surface treated to provide superior performance compared to untreated or chrome/nickel/zinc plated pins



Spherical Bushings

Bushings designed to accept alignment errors, angular misalignment or deformation of components during operation (bending of pins, etc.) and wide tolerances

