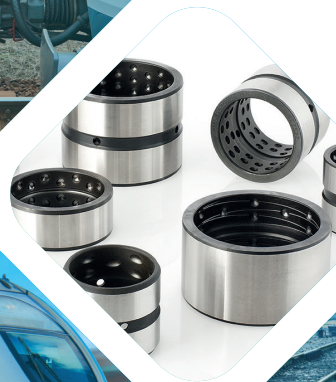




Surface materials engineering





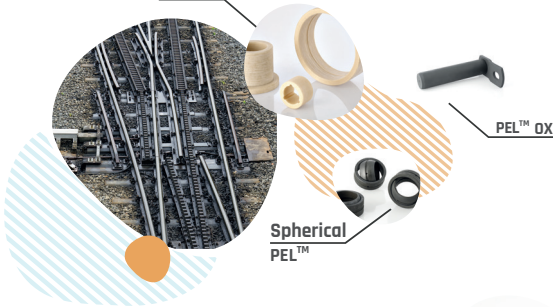
FRICTION COMPONENTS

HEF's engineered bushings and friction components are high-performance components designed to withstand demanding conditions, such as high loads, high temperatures, and abrasive environments. These bushings are developed to provide excellent frictional and anti-seizure properties, making them a key choice for railway applications.

Track maintenance



H LINER™



Infrastructure railway switching control device

Spherical PEL™

Rolling stock

Braking system
Torsion and anti-rolling bar
Coupling system

H-LINER™ S

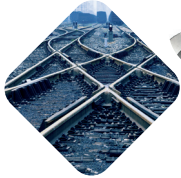
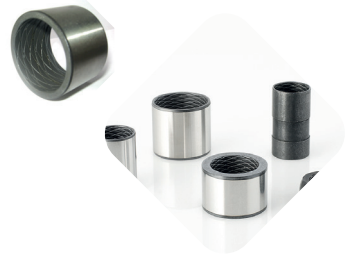


Spherical PEL™



PEL™ LG and HP BUSHINGS

- High dynamic pressure up to 125 MPa
- Good greasing intervals
- Abrasion and seizure resistance



H-LINER™ Self-lubricating composite bushings

- High dynamic pressure up to 140Pa
- Extended lifetime
- Abrasion resistance with H-Liner® with lips: patented bushings with integrated seals



PEL™ BH BUSHINGS

- Very high dynamic pressure up to 250MPa
- Long greasing intervals
- Abrasion and seizure resistance



PEL™ Spherical bushings

- Seizure resistance
- Long greasing intervals
- Shock resistance
- Extended lifetime



Tribology: Testing and R&D

- 60 Tribologists and R&D engineers
- More than 30 test benches
- Customizable tribometers
- Failure mode analysis: On site appraisal, SEM, 3D surface profile,...
- Studies in special environment: Cryogenic, High temperature, water, oil, grease,...
- More than 3000 studies in various industries



CLIN™

THERMOCHEMICAL SURFACE TREATMENT FOR TRIBOLOGICAL APPLICATIONS

CLIN™ technologies represent the liquid nitrocarburizing treatments offered by the HEF group. The CLIN™ family includes all the ARCOR®, TENIFER®, SURSULF®, QPQ®, TUFFTRIDE®, NUTRIDE®, MELONITE® brands, processes developed and patented by HEF. These treatments benefit from the circular economy thanks to ECO-CLIN™.

DOOR SYSTEM

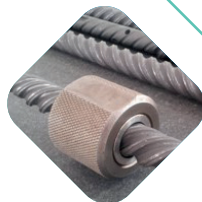
ENDLESS SCREW FOR TRAIN SLIDING DOORS

HEF solution:

- CLIN™ (ARCOR V2)
- PHOSPHATING + SDA 0 LF (phosphate 3~4µm / total thickness with SDA 10~20µm)

Example of specification :

- Steel: 40Cr
- Diffusion: 0.3 ~0.4 mm
- NSST: >96h
- Hardness: >650HV0.1



Backing plate = support of brake pad/lining

BRAKING SYSTEM COMPONENTS FOR TRAIN

HEF solution:

- CLIN™ (ARCOR VG)

Example of requirements :

- Corrosion resistance
- Wear resistance
- Adhesion (final painting step)
- Bending strength

HVAC

SCROLL COMPRESSOR COMPONENT FOR TRAIN

HEF solution:

- CLIN™ (ARCOR V2)
- PHOSPHATING

Example of requirements :

- Material: cast iron (FGL)
- Corrosion resistance
- Wear resistance
- Low distortion



Fixed & orbiting scroll



2023 Key figures

- 90 industrial plants
- 21 countries
- 3200 employees
- 329 M.€ turnover

