

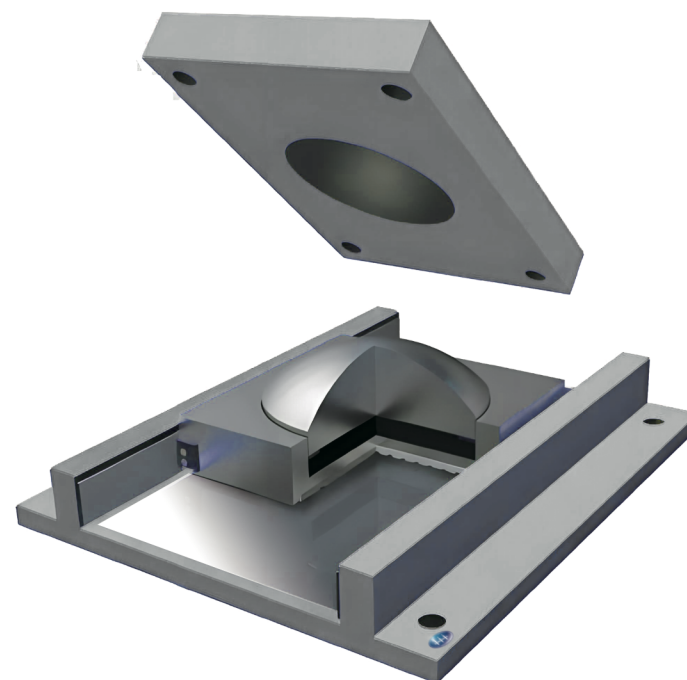
SELF-ALIGNING SLOPE BEARING

Innovative Bearing for Bridges with Variable Slope Adaptation

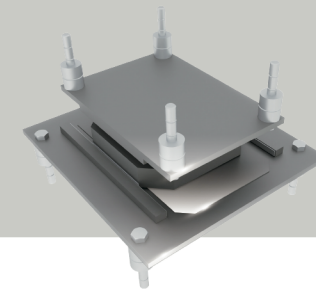
OVERVIEW

The Self-aligning Slope Bearing is an advanced structural bearing system designed to cater to the specific needs of bridges with varying slopes or inclines. Unlike conventional bearings that may require additional wedge-shaped plates for slope compensation, this bearing uses an innovative ball crown plate and top plate mechanism to automatically adjust to slopes in any direction. This allows the bridge deck to be smoothly supported and aligned without the need for extra components, simplifying installation and improving long-term performance.

The self-aligning design ensures that the bearing remains properly aligned under both vertical loads and lateral forces, preventing issues like load misalignment or uplift. This system is particularly beneficial for incrementally launched bridges and other applications where slope changes occur frequently or unpredictably.



exploded view of self-aligning slope bearing



KEY FEATURES

Automatic Slope Adaptation: The spherical design allows the bearing to automatically adapt to changes in the bridge's slope without the need for additional wedge-shaped steel plates. The system accommodates rotational movements up to 0.06 radians (equivalent to 6% slope), offering flexibility and ease of installation.

High Load-Bearing Capacity: The bearing supports a wide range of vertical loads, with available capacities from 1 MN to 60 MN, ensuring that it is suitable for both small and large-scale bridge projects.

Enhanced Durability: The bearing incorporates highly wear-resistant polyethylene plates instead of traditional PTFE, offering superior durability and reducing the need for frequent maintenance.

Vertical Shock Absorption: Similar to pot bearings, the Self-aligning Slope Bearing provides excellent vertical damping and shock absorption, distributing the loads evenly and extending the bearing's lifespan.

Friction-Reduced Sliding: The system uses stainless steel plates in conjunction with highly wear-resistant polyethylene and is lubricated with silicone grease, resulting in a low friction coefficient of ≤ 0.03 , ensuring smooth operation even under heavy loads.

High Horizontal Load Capacity: The bearing is designed to handle horizontal forces, with a capacity of 15-20% of the vertical load, making it suitable for bridges that experience significant lateral forces from wind or traffic.



Specially-designed Self-aligning Slope Bearing was assembled for Mazhu Expressway, Hubei Province, China

WORKING PRINCIPLE

• The Self-aligning Slope Bearing: utilizes a ball crown plate and top plate system, which allows the bearing to rotate and adjust to the bridge's slope in any direction. This movement ensures that the load remains centered on the bearing, even when installed on bridges with varying or shifting inclines.

• Ball Crown Plate and Top Plate: The spherical sliding mechanism allows the bearing to accommodate angular rotations up to 0.06 radians. This adaptability means the bearing can adjust in real-time to changes in slope as the bridge expands or contracts due to temperature fluctuations or other environmental factors.

• Load Distribution and Shock Absorption: The bearing distributes loads evenly across its surface, reducing pressure on localized areas and minimizing wear. The integration of elastic rubber pads further improves shock absorption, helping to protect the bridge from sudden load impacts.

MATERIAL COMPOSITION

The materials used in the Self-aligning Slope Bearing are designed for longevity, wear resistance, and the ability to withstand both vertical loads and rotational movements.

High-Strength Steel Plates

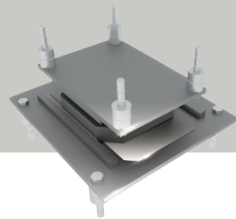
• **Q345 or Q355 Structural Steel:** The top and bottom support plates are constructed from high-strength steel, capable of withstanding high vertical loads without deformation. This ensures the bearing remains structurally sound under heavy traffic and extreme conditions.

Wear-Resistant Polyethylene Sliding Surface

• **Highly Wear-Resistant Polyethylene:** Used in place of PTFE/UHMWPE, this material provides superior durability, reduced friction, and longer service life. The polyethylene sliding surface interacts with the stainless steel to ensure smooth, friction-free movement.

Stainless Steel Sliding Plate

• The stainless steel plate provides a polished, corrosion-resistant surface for the sliding action of the polyethylene layer. This ensures minimal wear and a smooth sliding motion under varying loads.



IEC's Auto-rotating spray line for paint as corrosion-resistance

● DESIGN AND TECHNICAL SPECIFICATIONS

The Self-aligning Slope Bearing is designed to meet the needs of bridges with varying slopes and complex structural requirements. Key design parameters include:

- **Vertical Load Capacity:** Ranges from 1 MN to 60 MN, making the bearing suitable for projects of any scale.
- **Horizontal Load Capacity:** The bearing can withstand lateral forces of 15-20% of the vertical load, offering stability against wind and other lateral pressures.
- **Design Rotation Capacity:** Accommodates rotational movements up to 0.06 radians (equivalent to a 6% slope).
- **Friction Coefficient:** With a friction coefficient of ≤ 0.03 , the bearing allows for smooth and efficient movement under heavy loads.



Finished Self-aligning Slope Bearing

● TESTING AND QUALITY CONTROL

The Self-aligning Slope Bearing undergoes extensive testing to ensure optimal performance and compliance with international standards:

Vertical and Horizontal Load Testing: Bearings are subjected to maximum vertical and horizontal loads to verify that they can withstand the forces outlined in the design specifications.

Friction Testing: The sliding surfaces are tested to ensure that the friction coefficient remains within the acceptable range, even under high load and high-speed conditions.

Durability and Wear Resistance Testing: The polyethylene sliding surfaces are tested for wear resistance to ensure that the bearings maintain their low friction and long service life.

● COMPLIANCE WITH STANDARDS

The Self-aligning Slope Bearing is designed and manufactured in accordance with the following international standards:

- **EN 1337-1** – General Design Rules: This standard outlines the design principles for structural bearings, ensuring the safety and reliability of the bearing.
- **EN 1337-2** – Sliding Elements: Specifies the requirements for sliding elements used in bearings, ensuring low friction and smooth operation.
- **JT/T 391-2019** – Pot Bearings for Highway Bridges: Provides guidelines for the performance and testing of pot bearings in bridges.
- **GB/T 17955-2009** – Spherical Bearings for Bridges: Ensures compliance with Chinese standards for spherical bearing design and performance.

● APPLICATIONS

The Self-aligning Slope Bearing is ideal for use in bridges with varying slopes or complex inclines, as well as other infrastructure requiring flexible load distribution. It is particularly suitable for:

- **Incrementally Launched Bridges:** Where slope variations during installation require a bearing that can adapt to changing angles.
- **Highway Bridges:** Offering durability and adaptability to the changing loads and slopes common in large-scale bridge projects.
- **Railway Bridges:** Where high vertical and lateral loads require a bearing with exceptional load-bearing and slope adaptation capabilities.

● NOTABLE PROJECTS:



Mazhu Expressway, Hubei Province, China



WuSong River Project, Shanghai, China