Driving Industry Change
We work with customers to apply the right product for the right application. For example, while spherical roller bearings are useful in certain turbine applications, we are leading a design shift toward tapered and cylindrical roller bearings in large megawatt turbines. These bearing designs provide the greatest performance potential in the most compact design possible – reducing system size, weight and manufacturing costs.

A Total System Approach
Timken has more than a century of experience helping customers solve their toughest technical problems. None are more challenging than those facing the wind energy industry. As wind turbines continue to grow in size to increase energy output, systems are subject to greater loads and expectations than ever before.

Throughout the entire lifecycle of a bearing, Timken is there to help maximize equipment performance. We collaborate with turbine and gear drive designers to explore the wide range of operating parameters commonly experienced by wind turbines. Using our proprietary engineering system – Syber Advanced System Analysis – we can identify optimum friction-management solutions for each application. For turbine operators, Timken provides a full range of support to maximize equipment performance and reliability, from replacement bearings and remanufacturing services to condition monitoring and lubrication systems.

Global Customer Support
With nearly 200 technology, manufacturing, sales and distribution facilities in 26 countries, Timken has a global network with a single commitment to meeting customer needs everywhere. Technical and service engineers are stationed worldwide to quickly respond to customer requests.

Innovative New Designs
We are creating new products and technologies that are transforming the way turbines are designed. Our power transmission advancements have inspired the development of planetary gear bearing assemblies like the Timken® integrated Flexpin bearing, which enables smaller, lighter gears for weight-sensitive wind gear drive systems.

The Wind Turbine Challenge
+ Costs associated with turbine operation and maintenance
+ High incidence of bearing-related performance issues and the impact on equipment reliability
+ Managing greater loads as wind turbines grow in size to increase energy output
+ Maintaining a reduced head mass size as turbines increase in megawatt size
+ Supply chain constraints that impact bearing availability

The Timken Solution
+ Our products are designed to improve reliability and performance, helping to increase equipment uptime and productivity
+ To optimize performance, we address the complete wind turbine system, not just the main shaft and gear drive
+ Power dense Timken® bearing designs help reduce wind turbine capital costs
+ Our total lifecycle approach supports customer needs for the duration of a bearing’s useful life and beyond
+ Timken service engineers provide on-site troubleshooting, technical assistance and training
+ Our global manufacturing footprint allows us to supply products locally, simplifying logistics

Around the world, wind turbine designers and operators are turning to Timken for power transmission and friction management solutions that increase uptime and improve total system performance. Through customer collaboration and technical innovation, we are advancing tomorrow’s wind turbine designs today.

www.bearing.sg
**TIMKEN® BEARINGS FOR DIRECT DRIVE WIND TURBINES**

- Ultra-Large Double-Row Tapered Roller Bearing for Main Shafts
- Single-Row Tapered Roller Bearing (Type TS) System
- Double-Row Tapered Roller Bearing (Type TDO) with Cylindrical Roller Bearing

**TIMKEN® BEARINGS FOR HYBRID WIND TURBINES**

- Ultra-Large Double-Row Tapered Roller Bearing for Main Shafts
- Cylindrical Roller Bearing
- Single-Row Tapered Roller Bearing (Type TS)
- Double-Row Tapered Roller Bearing (Type TDO)

www.bearing.sg
TAPERED ROLLER BEARINGS

Designed to bear both thrust and radial loads, tapered roller bearings are ideally suited for managing application stresses as the wind changes in both velocity and direction. They are also power dense, providing the greatest performance in the most compact design possible.

Single-Row Tapered Roller Bearing (Type T1)

This bearing design supports all combinations of radial and thrust loading with true rolling motion on the raceway contacts. Internal clearance can be set during assembly. Separable inner and outer races make assembly easier during equipment builds and routine maintenance.

Double-Row Tapered Roller Bearing (Type TD1)

With two rows of rollers and a one-piece inner race, these direct-mount tapered roller bearings support all combinations of radial and thrust loading without inducing additional loading on the main shaft. This bearing design is excellent for locating positions on the main shaft and in gearboxes.

Tapered Double-O-Single-Row Bearing with Spherical Outside Diameter (Type TDODA)

This unique design is preloaded to minimize vibration and wear on the main shaft. It also deters false brinelling while the rotor is stationary. Preloading reduces main shaft axial movement, which helps minimize gearbox thrusting. These bearings also can be retrofitted to most wind turbines already in operation.

Ultra-Large Double-Row Tapered Roller Bearing for Main Shafts

This single, compact bearing design is ideal for direct drive wind turbines. The double-row tapered roller bearing is preloaded to help maximize system stiffness, load zones and bearing L10 fatigue life. The versatile raceway construction can accommodate seal-loading surfaces, bolt circles, pilots and other special features.

Tapered Roller Bearing for Locating Position

These tapered roller bearings are designed specifically to fix the location of parallel shafting in a compact axial space within helical and spur gear drive systems. The single-row construction is designed to improve bearing efficiency and supports all radial loading and bidirectional gear thrust. Locator bearings operate with 360° roller contact in positive torque power generation conditions, which helps maintain continual gear contact.

CYLINDRICAL ROLLER BEARINGS

Cylindrical roller bearings are a popular choice for several wind turbine applications because they offer greater radial load carrying capability than other bearing types. They are the preferred bearings for non-locating bearing positions and provide outstanding float capability along the true-rolling-motion surfaces between the raceways and rolling elements.

www.bearking.com

SPHERICAL ROLLER BEARINGS

Timken currently manufactures a broad range of spherical roller bearings, which are designed to manage high radial loads even when misalignment, poor lubrication, contamination, extreme speeds or critical application stresses are present. Spherical roller bearings are only suitable for certain wind applications.

ADVANCED PLANETARY GEAR ASSEMBLIES

For highly challenging planetary gear drive applications, Timken offers two advanced assemblies that provide more power than traditional system designs.

Integrated Flexpin Bearing

This assembly helps gear designers reduce system weight and size while increasing power throughput. The integrated flexpin bending pattern also equalizes load distribution among the planets and the gear face for greater bearing life and performance. Load distribution is improved through flexible pins that help equalize force distribution among the planets while transmitting torque at various levels. The preset bearing clearance range helps simplify installation and handling.

Planet Pac Bearing

Integrated planet gear bearing assemblies feature finished races that maximize resistance to gear pitting fatigue. The fully-integrated design helps reduce wear, debris and added clearances created by the outer bearing races processing inside of the planet gears. One- and two-piece straddle carriers help maintain structural performance and provide enough space for bearings while keeping the design compact enough to reduce system weight and costs.

TIMKEN® INTEGRATED FLEXPIN BEARING IMPROVES PLANETARY GEARBOX LOAD DISTRIBUTION AND RELIABILITY

While planetary gearbox designs offer higher power density and greater performance than other configurations, they can also cause high bearing loads and design complexity. The Timken integrated flexpin bearing offers a solution. Greater power density is achieved by integrating the bearing components, gearing and shafting. The integrated flexpin bearing also offers design flexibility because it can be used with a variety of gearing system configurations. Additional surface treatments to gear faces and rolling elements are available for improved equipment life and efficiency.
Debris Solutions

Timken’s coatings and surface finishes can be applied to wind turbine bearings and gears to protect against debris-induced wear. Timken’s coatings are designed to provide protection against particle damage and to extend the life of the equipment. These coatings are typically required to operate in lubricants that are contaminated with large-particle debris. Timken’s coatings are applied to wind turbine bearings and gears for specific applications, and the coatings enhance fatigue life, corrosion resistance, and resistance to abrasion. Timken’s coatings and surface finishes can be engineered to meet the specific needs of each application.

Lubrication

Timken’s lubrication system is designed to keep wind turbine bearings and gears properly lubricated. The system is designed to prevent contamination and maximize wind turbine performance. Timken’s lubrication system is designed to prevent fluid contamination and to provide lubrication in a high-debris environment. Timken’s lubrication system is designed to keep wind turbine bearings and gears properly lubricated and to prevent contamination.

Reliability Solutions

Timken’s reliability solutions are designed to help prevent unseen mechanical problems so you can get the most out of your equipment. Timken’s reliability solutions include bearing isolators, seals, and lubrication in and contaminants out. Bearing isolators are designed to prevent contamination and to keep wind turbine bearings and gears properly lubricated. Timken’s lubrication system is designed to prevent contamination and to provide lubrication in a high-debris environment. Timken’s lubrication system is designed to keep wind turbine bearings and gears properly lubricated and to prevent contamination.

Improving Reliability with the Timken Online Intelligence System for Wind

The Timken Online Intelligence System for wind applications looks at vibration, shock pulses, and digital inputs to detect potential problems before they occur in gear drives, generators, or shaft bearings. The Timken system is designed for wind applications because it addresses monitoring challenges such as short data windows, transient vibrations, signal challenges, and slow speeds. The Timken system is designed for wind applications because it addresses monitoring challenges such as short data windows, transient vibrations, signal challenges, and slow speeds. The Timken system is designed for wind applications because it addresses monitoring challenges such as short data windows, transient vibrations, signal challenges, and slow speeds.

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The Timken Company keeps the world turning, with innovative friction management and power transmission products and services, enabling our customers’ machinery to perform more efficiently and reliably. Timken is Where You Turn™ for better performance.

Timken is your source for wind energy solutions. For more information, contact your Timken representative or visit timken.com.