

TIMKEN® WEAR- RESISTANT BEARINGS

TIMKEN

Where You Turn®

TIMKEN INTRODUCES WEAR-RESISTANT BEARINGS FOR WIND ENERGY

The wind energy market faces some of the toughest challenges for extending bearing life and reducing wear. Timken, with more than 110 years of friction management knowledge, has developed a bearing that is designed to handle the challenge.

Called wear-resistant bearings, this product was designed to reduce life-limiting wear problems for main shaft and gearbox bearings. Common wear problems include micropitting on main shaft spherical roller bearings and micropitting, smearing and brittle flaking for wind turbine gearbox bearings. In addition to reducing

the wear problems, Timken® wear-resistant bearings also provide up to 3.5 times greater L10 life for main shaft and gearbox bearings.

The benefits of using Timken's wear-resistant bearings include resistance to:

- + Smearing, scuffing and false brinelling damage
- + Life reduction from debris damage
- + Low cycle micropitting

PRODUCT KNOWLEDGE SOLVES INDUSTRY PROBLEM

Timken, with its extensive knowledge of friction management, was able to identify some of the common causes of bearing failure in wind energy main shaft and gearbox bearings and the corresponding solution. Our engineering team has the product knowledge and industry know-how to design a true, wear-resistant bearing.

PRODUCT LIFECYCLE

For wind turbine operators, wear-resistant bearings from Timken are the right choice for replacement bearings. In fact, wear-resistant bearings reduce the micropitting, smearing and brittle flaking often seen in competitors' original equipment bearings for wind turbine main shaft and gearbox applications.

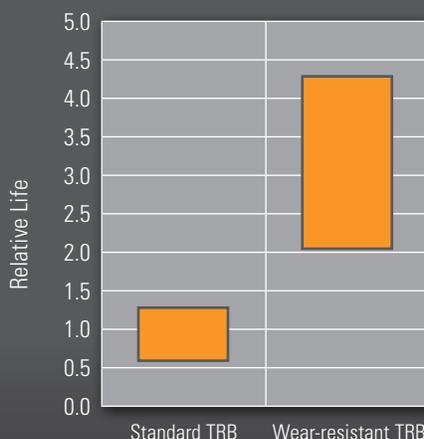
Timken's focus on the bearing lifecycle extends beyond bearings. Timken provides a full range of support to maximize equipment performance and reliability, which includes replacement bearings and remanufacturing services to condition monitoring and lubrication systems.

Our total lifecycle approach is designed to support customer needs for the duration of a bearing's useful life and beyond. For example, Timken's global service engineering network can provide on-site troubleshooting, technical assistance and training.

The Wear-Resistant Bearing Advantage

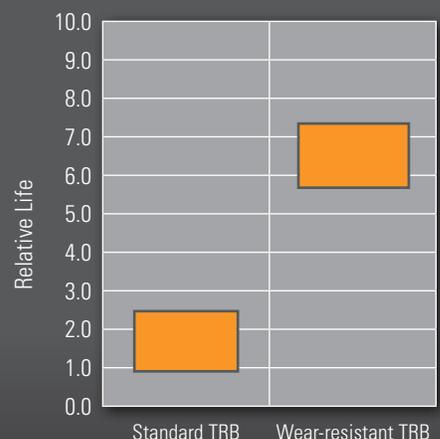
Advantage	Wear-Resistant Bearings
Reduces smearing, micropitting and fretting	Wear-resistant bearing materials help defeat the adhesive wear mechanisms that cause smearing, micropitting and fretting.
Scoring resistance from loss of lubrication	Materials in the wear-resistant bearings form barriers to adhesive wear during brief periods of lube starvation.
Debris tolerance	Specially designed rollers in the wear-resistant bearings remove shoulders around debris craters on raceways and reduce surface roughness on the ring raceways.
Enhanced low Δ (lambda) fatigue life	Specially designed rollers polish raceways, reducing Ra (surface finish) and increasing Δ (lambda).
Increased efficiency	Specially designed rollers polish ring raceways, reducing surface roughness, increasing Δ (lambda), reducing rolling torque, and increasing efficiency.

Timken wear-resistant bearings: Longer bearing life



Debris Tolerance Testing

In debris-laden environments, Timken testing shows that wear resistant tapered roller bearings have 60% longer life than standard tapered roller bearings.



Bearing Life Testing

In low lambda conditions, Timken testing shows that wear-resistant tapered roller bearings have up to 350% longer life than standard tapered roller bearings.

TIMKEN SOLUTIONS FOR SUSTAINABLE WIND POWER

For Modular Wind Turbines, Direct Drive Wind Turbines And Hybrid Wind Turbines



Timken® Middle Frequency Induction Heaters help you efficiently install bearings and gears, while protecting the work piece from damage.

Timken® Wind Energy Seals offer a variety of sealing options to meet the demanding requirements of the main shaft bearing. They are available in elastomeric, PTFE and EcoTurn labyrinth styles.

Timken® Wind Energy Lubrication System is an engineered system that meters the flow of grease in and out of the main shaft bearings, optimizing bearing and seal performance. It ensures that fresh grease is provided over the lifecycle of the bearing, and that old grease is purged.

Timken® Online Intelligence System provides advanced condition monitoring of key turbine components. Utilizing shock pulse HD, this unit – combined with Timken® services – provides unmatched data collection and analysis.

Timken® UltraWind Bearings are single- or double-row tapered roller bearings specifically designed to fit your main shaft application. Utilizing world-class engineering and made from super clean steel, these bearings deliver the ultimate in performance and reliability.

THE TIMKEN EXPERIENCE

With Timken®, you get friction management and power-transmission expertise, precision manufacturing capabilities and world-class engineering. It's all part of the value that Timken brings to the wind industry, including:

Advanced solutions that work: 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 – Timken Syber Wind Bearing System Analysis – we can identify enhanced friction-management solutions for each application. Syber Analysis improves gearbox design, predicts potential damage and reduces product development time and costs.

Total system approach: We work with customers to apply the right product for the right application. Our solutions are designed to improve reliability and performance of main shaft and gear drive applications while helping to increase productivity and reduce cost of ownership.

Unparalleled engineering expertise: We're passionate about developing technical solutions and services that enable our

customers' equipment to run harder, faster and longer with enhanced durability and superior performance. We have nearly a century of unmatched expertise in mechanical power transmission, anti-friction bearing design, tribology, metallurgy, clean steel making, precision manufacturing, metrology and engineered surfaces.

Unique global network: We simplify logistics with a global manufacturing footprint that allows us to supply most products locally. With nearly 150 technology, manufacturing, sales and distribution facilities in 26 countries and territories, we are committed to meeting customer needs anywhere, any time.

Valuable lifecycle perspective: Throughout the entire bearing lifecycle, Timken is there to help maximize equipment performance. For turbine operators, Timken provides a full range of support to maximize equipment performance and reduce the total cost of ownership, from replacement bearings and upgraded solutions to remanufacturing services, condition monitoring and lubrication systems.

THE TIMKEN COMPANY

The Timken Company helps keep the world turning with innovative friction management and power transmission products and related products and services, enabling our customers' machinery to perform longer and more efficiently. Timken is Where You Turn® for better performance.

FOR MORE INFORMATION

To learn more about our expanded series of wind energy products and services, contact your local Timken representative or visit www.timken.com.

TIMKEN
Where You Turn®

Bearings • Steel •
Precision Components • Systems • Lubrication •
Seals • Remanufacture and Repair •
Industrial Services

www.timken.com

Timken® and Where You Turn® are registered trademarks of The Timken Company.

© 2010 The Timken Company
Printed in U.S.A.
10M 05-10-29 Order No. 10364