TIMKEN



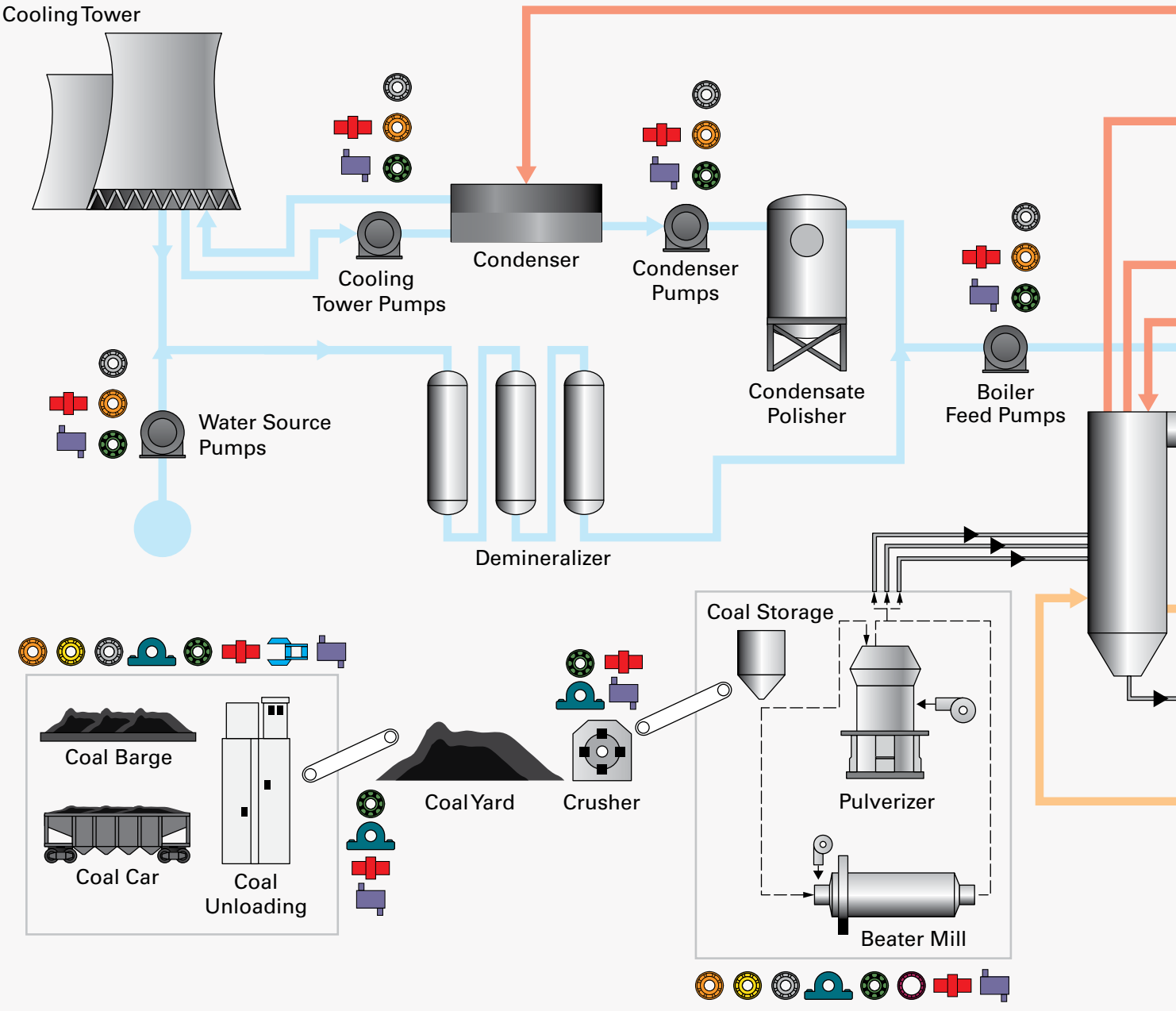
Timken Solutions for the Coal Power Generation Industry

Reliable Technology, Dependable Power

Timken supplies the products and services you rely on to help you provide power to your customers.

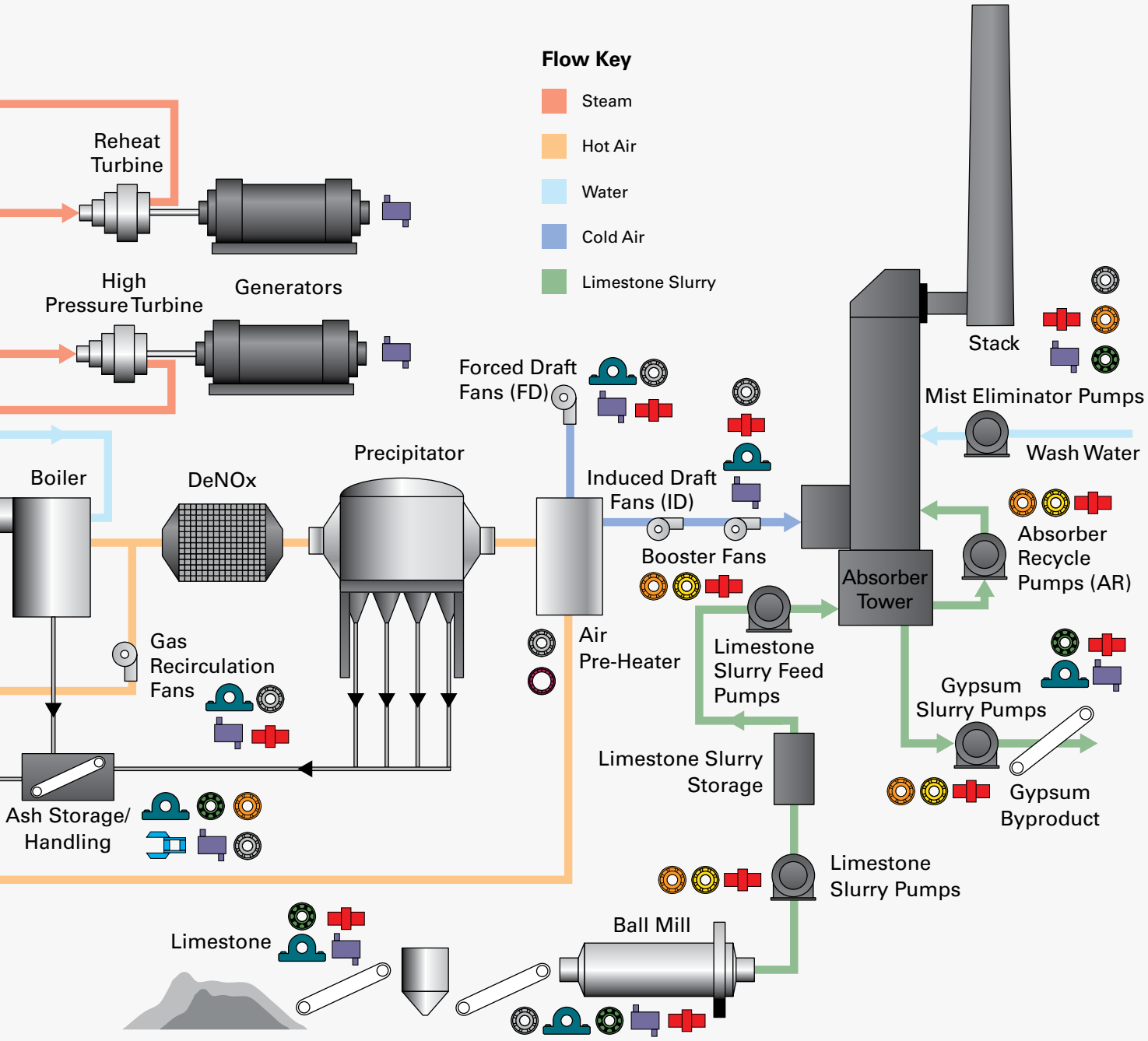
We do this by extending our longtime industry and application experience to your operations, providing quality products, technical expertise, and world-class availability and delivery. We focus on you, helping to strengthen your reliability and uptime so that you are operating when customers need power most.

Timken Products and Services By Location



Timken Product Key

- Tapered Roller Bearing
- Cylindrical Roller Bearing
- Spherical Roller Bearing
- Thrust Roller Bearing
- Housed Unit
- Radial Ball Bearing
- Coupling
- Chain
- Gearbox Repair



Coal Pulverizers

Our knowledge and experience with the operating challenges facing coal pulverizers led Timken to develop a range of high-performance bearings for the journal position.

Timken DuraSpexx® bearings' modified designs offer enhancements to improve bearing life in harsh, high-stress environments. Incorporating proprietary technology, they employ special coatings and finishes, special geometries and enhanced materials.

From the gearbox to the pulverizer journal to the classifier and the beater mills, Timken application experience has created solutions that offer customers enhanced bearing life, helping reduce maintenance intervals – increasing uptime and performance.



Industry Experience Helps Improve Uptime and Enhance Performance

For decades, Timken has been working with OEMs around the world to help develop products for our customers.

Timken engineers can model your bearing environment to identify opportunities for performance improvement - combining our application experience and your needs to design specific solutions that yield longer bearing life.

Whether the design calls for the use of tapered roller bearings or a combination of cylindrical and spherical roller bearings, Timken has a full range of high performance products to help improve uptime and reliability. We can provide the right bearing for the application to meet every customer's needs.

Our in-depth knowledge of bearings and industrial operations forms the basis of our successful customer relationships.

Gearbox, Bearing and Electrical Repair Solutions

In addition to our full range of bearings and related components, we provide a comprehensive suite of gearbox, bearing and electrical motor repair services and solutions that help you operate more efficiently and reduce costs.

Gearbox Repair

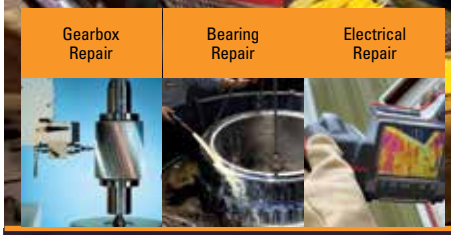
Utilizing the latest technology, we provide full inspection, repair and upgrade services. Timken can reverse engineer any gear drive or component to OEM specifications. Services include performing root cause analysis of gearbox failure, full disassembly and cleaning, inspection and measurement, engineering evaluation and recommendations, performance of repairs and full-speed spin testing.

Bearing Repair

We can increase the useful life of original bearings up to three times – helping you save up to 60 percent of the cost of a new bearing. We repair any brand and type of bearing up to 2,134 mm (84 in.) outside diameter.

Electrical Repair

Expert motor and electrical engineers use advanced diagnostics and technologies that can increase equipment performance with customized design solutions. Services include motor rewinding, motor repair from fractional to multi-thousand horsepower, field service, maintenance and onsite repair.



Expert and Efficient Repair for Pulverizer Gearboxes

Coal-fired power plants throughout the United States and across the globe rely on expert and efficient gearbox repair services from Timken, to help keep their field operations running as reliably as possible.

Our expertise in pulverizer gearboxes extends over decades, starting with Philadelphia Gear, a Timken brand. Since the 1960s Timken has designed and produced more than 1,000 pulverizer gearboxes. Most of these pulverizer gearboxes are still operating today. In 1973, we were the first to introduce the modular gearbox component design, allowing the gearbox to be removed without having to take apart the entire pulverizer.

Timken has produced and supplied pulverizer gearboxes to most major pulverizer OEMs. Today, we have expanded our capabilities to provide a full suite of gearbox offerings to support the power-gen market. From new gearboxes to repair and rebuild services, Timken has the knowledge and expertise to support your gearbox needs.

Crushing and Conveying

Timken products can simplify maintenance and improve performance in conveyors, belt feeders, stackers, loaders, reclaimers, crushers and dust collectors.

Engineered and built to withstand vibration and contamination, the family of Timken housed units feature multiple, robust sealing options, durable steel or cast iron housings and utilize highly engineered Timken bearings that run cooler and more efficiently – excelling in challenging applications.

Timken® solid block spherical roller bearing housed units can run on misaligned shafts up to ±1.5 degrees without a reduction in life expectancy.

Timken® split block housed units provide outstanding performance in a compact package for crushers and conveyors.



Timken Solution: **Housed Units Improve Mill Uptime**

Coal transportation is one of the most critical bearing applications due to the high cost of downtime. Coal is a harsh contaminant, which causes bearing seals to deteriorate, allowing contaminant penetration into the bearing system, resulting in premature bearing failure. Service and replacement are long, expensive processes.

A power plant near Rome, Italy was using split plummer block bearing assemblies for their conveyors, which failed repeatedly due to high levels of contamination.

Timken offered a multi seal design, fitting within their existing design envelope, and cured their contamination problems with a quick and easy-to-mount "drop in" housed unit. The customer was able to convert to Timken® spherical roller bearing solid-block housed units for improved uptime and lower maintenance costs.

By offering customers housed units with multiple sealing options, we customize solutions to withstand debris contamination in specific application environments, exceeding the service life of competing bearings.



Air-Handling Equipment and Pumps

Our range of housed units, spherical roller bearings and couplings helps keep you running efficiently.

Draft Fans

Timken housed units, engineered with ultra-tough housings, precision-designed bearings and robust sealing options help increase reliability and withstand extreme temperatures, pressure and corrosion, helping to decrease overall cost of ownership.

Pre-Heaters

Timken® thrust spherical bearings feature improved internal geometry which optimize roller size and cage designs to help maximize bearing load ratings. In addition, these design upgrades improve lubrication flow and lower torque and operating temperatures. Our thrust spherical bearings combine premium materials, advanced manufacturing techniques and a world-class quality assurance program, designed for your needs.

Pumps

Timken® tapered and cylindrical roller bearings, couplings and roller housed units provide outstanding reliability to help ensure your feed-water, cooling-water, condensate, slurry and absorber-recycle pumps operate continuously with less downtime.



Draft Fans

Timken roller bearing housed units, available in a large range of customary and metric sizes, feature precision-engineered Timken bearings, durable housings, multiple sealing options and housing covers best suited for the task. These units are an excellent choice for induced-draft and forced-draft fans.

Our engineers help you choose the right combination of bearings and accessories to help improve fan performance and application life – increasing uptime and reducing maintenance costs.

Pre-Heater

Timken offers one of the widest ranges of thrust spherical bearings; with bearing sizes ranging from 90 mm to 1000 mm bore (3.5 in. to 39.4 in.)

Timken load ratings meet or exceed industry competitors and can efficiently and effectively support the weight of the vertical shaft in the air pre-heaters.

Timken thrust spherical bearings can help you reduce maintenance costs and extend operating intervals between major overhauls.

Pumps

Timken cylindrical and tapered roller bearings, available in a wide range of sizes, feature premium cages, optimized internal geometries, enhanced surface finishes and compact designs.

Timken cylindrical and tapered roller bearings effectively reduce friction and help transmit power in a variety of pump applications – helping improve application uptime and performance.

TIMKEN BEARING SOLUTIONS FOR THE COAL POWER GENERATION INDUSTRY



Tapered Roller Bearings

Timken is the industry authority for tapered roller bearing quality and performance. Benefits include:

- Reduced energy consumption through enhanced surface finishes and optimized internal geometry.
- Longer bearing life and greater reliability due to positive roller alignment.
- Optimized bearing performance through application-specific endplay and preload conditions.
- The industry's broadest range of sizes and configurations.

Applications: coal barges, coal cars, crushers, pulverizers, boiler feed pumps, condenser pumps, water source pumps, ash storage/handling, air pre-heaters, limestone slurry feed pumps, mist eliminator pumps, absorber recycle pumps

Debris-Resistant Bearings

Timken debris-resistant bearings extend bearing life up to 3.5 times and are ideal for tough, dirty conditions.

- Proprietary alloy heat-treatment modifications and diamond-like coating technology interrupt adhesive wear and can self repair any microcracking.
- Advanced manufacturing processes allow Timken to offer these bearings economically in both large and small quantities.

Applications: pulverizer journals



Cylindrical Roller Bearings

The full range of Timken cylindrical roller bearings includes single-, double- and four-row configurations. Our EMA series cylindrical roller bearing provides industry leading performance.

- Designs provide option to manage axial loads in either one or both directions, or permit axial float in two directions.
- Surface finishes on the EMA series nearly double the operating lambda ratio, resulting in 1.5 times increase in predicted bearing life.
- Timken EMA series cylindrical roller bearings feature a one-piece brass cage that minimizes drag on the rolling elements, reducing heat and improving bearing life.
- Improved lubrication flow due to open-pocket cage design, as well as lubrication holes and grooves.

Applications: coal barges, coal cars, pulverizers, limestone slurry feed pumps, gypsum slurry feed pumps, absorber recycle pumps, mist eliminator pumps



Spherical Roller Bearings

Timken® spherical roller bearings manage high radial loads, even in challenging conditions, including misalignment, marginal lubrication, contamination, extreme speeds and critical application stresses.

- Higher load and speed ratings reflect enhanced performance levels, due to optimized internal geometry and improved surface finishes.
- Slotted cage made of hardened steel improves lubrication flow to provide lower operating temperatures and increased bearing life.
- Timken spherical roller bearings offer industry leading thermal and limiting speed capability.
- Available with rugged steel (EJ series) and machined brass retainers (EM or EMB series).

Applications: coal barges, coal cars, crushers, pulverizers, boiler feed pumps, condenser pumps, cooling tower pumps, water source pumps, ash storage/handling, gas recirculation fans, conveyors, forced draft fans, induced draft fans



The Timken Family of Housed Units

The Timken family of housed units provides enhanced bearing protection in a multitude of harsh conditions. Our housed units feature robust sealing options – enhancing bearing protection in debris-filled, contaminated or high-moisture environments.

Type E Tapered Roller Bearing Solid-Block Housed Units

- Enhanced bearing surface textures and profiles
- Improved grease retention with double-lip seals
- Corrosion resistant electro-deposition paint

Spherical Roller Bearing Solid-Block Housed Units

- Multiple primary and secondary sealing options
- Able to run efficiently on misaligned shafts up to +/-1.5 degrees without a reduction in life expectancy

Split Block Housed Units

- Uniquely designed bearings run cooler and more efficiently than competitive designs
- Available in tapered or straight bore designs

Ball Bearing Housed Units

- Corrosion-resistant black epoxy powder coating
- Available in many configurations with a variety of locking systems

Applications: conveyors, crushers, coal storage, pulverizers, gas recirculation fans, ball mills, forced- and induced- draft fans



Thrust Roller Bearings

Timken® thrust bearings are designed to manage thrust (axial) loads and provide high-shock-load resistance in a variety of power-generation applications. Choose from one of our six basic thrust bearing types for your applications: ball, crossed roller, cylindrical, machined tapered, stamped tapered and spherical.

Applications: pulverizers, pulverizer gearboxes, air preheaters



DuraSpexx® and DuraSpexx® Power Rating Bearings

With DuraSpexx® bearings, Timken engineers use sophisticated, application-focused computer programs to help model a customer's operating environment and recommend specially-designed bearings that yield longer life.

- Surface finishing options reduce peeling and fatigue in high-temperature and thin lubricant film environments.
- Engineered profiles distribute stress more evenly under high loads and/or misalignment.
- Series of features on standard designs enhance performance without the need for a costly total system redesign.

Applications: pulverizer gearbox, pulverizer journal



Radial Ball Bearings

Radial ball bearings handle radial and axial loads from either direction. Timken offers versatile designs that permit relatively high-speed operation. In addition to standard single-row deep groove bearings, we offer special designs, including a maximum capacity series and an extra-large (XLS) radial series bearing. Timken also offers a full range of angular contact double row ball bearings.

- Special coatings for additional corrosion resistance.
- Special seal designs help keep lubrication in and contamination out.
- Snap ring grooves are available to simplify mounting.
- Various seal and shield configurations help protect internal bearing components and retain lubricants.

Applications: coal barges, coal cars, conveyors, boiler feed pumps, pulverizers, condenser pumps, cooling tower pumps, water source pumps, ball mills, mist eliminator pumps

TIMKEN PRODUCT AND SERVICE SOLUTIONS FOR THE COAL POWER GENERATION INDUSTRY



Condition Monitoring

Identify potential system issues before failure occurs with Timken condition monitoring solutions, which evaluate bearing condition, lubrication quality and machine vibration. Customized programs help reduce maintenance and capital expenses, while increasing productivity, uptime and safety. Products include a variety of handheld devices and online systems for periodic or continuous monitoring.



Maintenance Tools

Timken maintenance tools make bearing installation, removal and service safer and easier. Choose from a variety of induction heaters, impact fitting tools, and hydraulic and mechanical pullers. Timken field specialists are available for training on proper tool usage and maintenance procedures.



Timken Power Systems - Electrical, Gearbox & Bearing Repair

The Timken Company, drawing on a global pool of engineering expertise and technological advancements, provides a comprehensive suite of industrial repair, upgrade and service solutions. When viewed as an integral part of your operations, these solutions help reduce downtime and your total cost of operation.

From electrical to gearbox to bearing repair solutions, trust Timken Power Systems to help maximize your powertrain and rotating equipment's reliability and performance.





Service Engineering

Timken service engineers apply their expertise on site to help ensure equipment is installed properly and operates efficiently. They also deliver customized training for customers' maintenance teams.

Training and Certification

Timken service engineers provide the premier bearing maintenance training programs in the power generation industry. Timken maintenance training covers all bearing types, is 100 percent technical in scope, and includes both pre-tests and post-tests to ensure that students understand the concepts presented. Timken training is modular and customizable to suit your operation's specific needs. Seminars range from two hours to three days long. To encourage trained maintenance professionals to remember and apply the coursework – providing long-term value to operators – Timken service engineers can return later to conduct a Timken Bearing Certified Audit.



Couplings

Timken Quick-Flex® elastomeric couplings operate in harsh environments, providing durability while requiring minimum maintenance.

- Timken Quick-Flex couplings are easy to install, can handle up to 2 degrees of misalignment and require no lubrication
- Reduce downtime and replacement costs by replacing inserts without moving or disassembling the driving or driven equipment
- Elastomeric couplings are interchangeable with most other comparably sized couplings, regardless of type
- Elastomeric couplings have four insert choices for varying torque needs and temperature ranges
- Timken also offers cast steel rigid couplings, an excellent choice for joining shafts of the same size



Chain

Timken manufactures chain that performs well in demanding environments, built to precise specifications for strength and maximum wear life. Our offering includes a complete line of precision roller chain, attachment chain, engineered chain and corrosion-resistant chain.



Seals

Our complete line of Timken® seals are designed to keep contaminants out and lubrication in. Suitable options are available for a range of applications and include grease seals, oil seals and advanced bearing isolators in inch and metric sizes.



Lubricants

Timken developed its line of application- and environment-specific lubricants by leveraging deep knowledge of tribology and anti-friction bearings and how these two elements affect overall system performance. Timken® lubricants help bearings and related components operate effectively in demanding industrial operations. High-temperature, anti-wear and water-resistant additives offer superior protection in challenging environments.



Lubrication Systems

Timken offers a wide variety of single-point and centralized multi-point lubrication systems that consistently distribute grease into machine operations. These canisters can be filled with Timken lubricants or many other types of commercial lubricants and mounted in place with a full line of Timken accessories. Timken continues to expand its range of centralized lubrication solutions to help improve aggregate equipment performance around the world.



You can rely on Timken to deliver what you need so you're always on when customers need you most. Through our longtime industry and application experience, we supply quality products and services that are delivered on-time by technical experts. Contact your Timken sales or service representative today, and learn how we can help keep your operations running efficiently and reliably.

TIMKEN

The Timken team applies their know-how to improve the reliability and performance of machinery in diverse markets worldwide. The company designs, makes and markets mechanical components, including bearings, belts, chain, gears and related mechanical power transmission products and services.

Stronger. **Commitment.** Stronger. **Value.** Stronger. **Worldwide.** Stronger. **Together.** | **Stronger.** By Design.

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