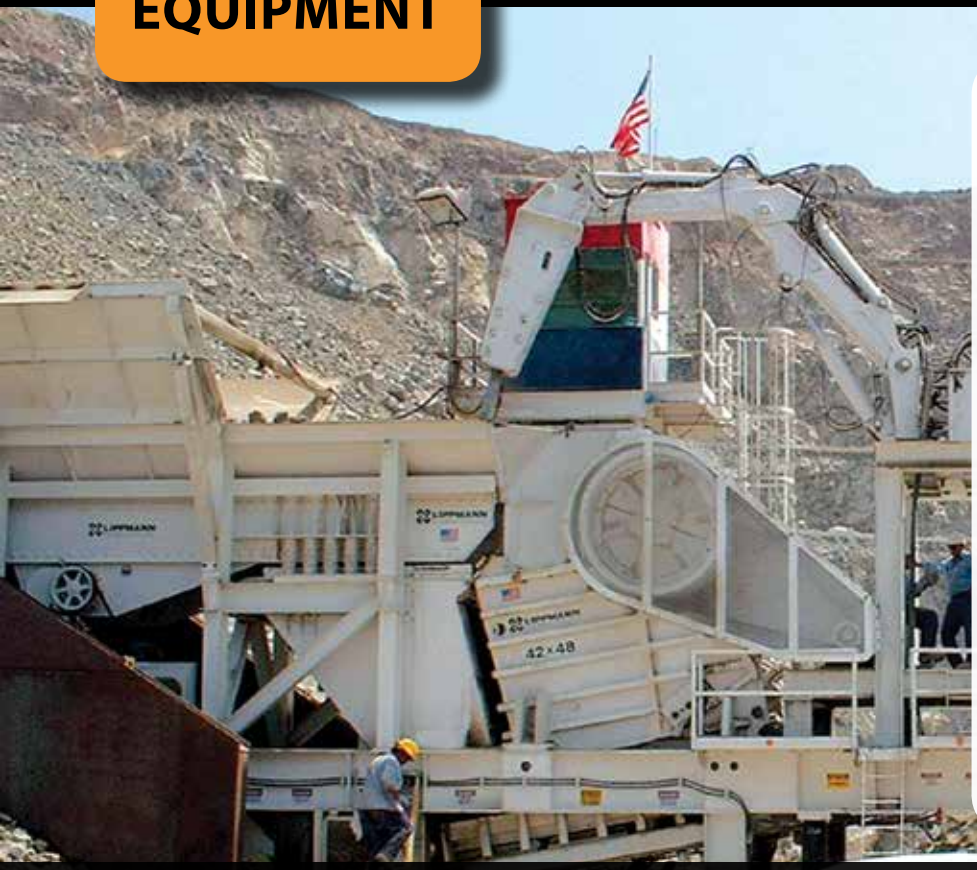


IMPROVED RELIABILITY

Our Promise to You

Engineered Solutions for the Aggregate Industry.
Stronger. Together.

CRUSHING EQUIPMENT



Exposure to operating conditions that include shock loads and severe contamination make crusher equipment one of the toughest applications for precision components, particularly bearings. Keeping machine availability high and total cost of ownership low in these harsh conditions requires specialized engineering and materials knowledge from your bearing supplier.

Timken has the design know-how to help handle heavy shock loads, contamination and lubrication challenges. Experience and specialized technical expertise have helped us develop a collection of engineered surfaces to combat these issues including enhanced surface finishes, material coatings and special heat treat options all designed to strengthen component performance.

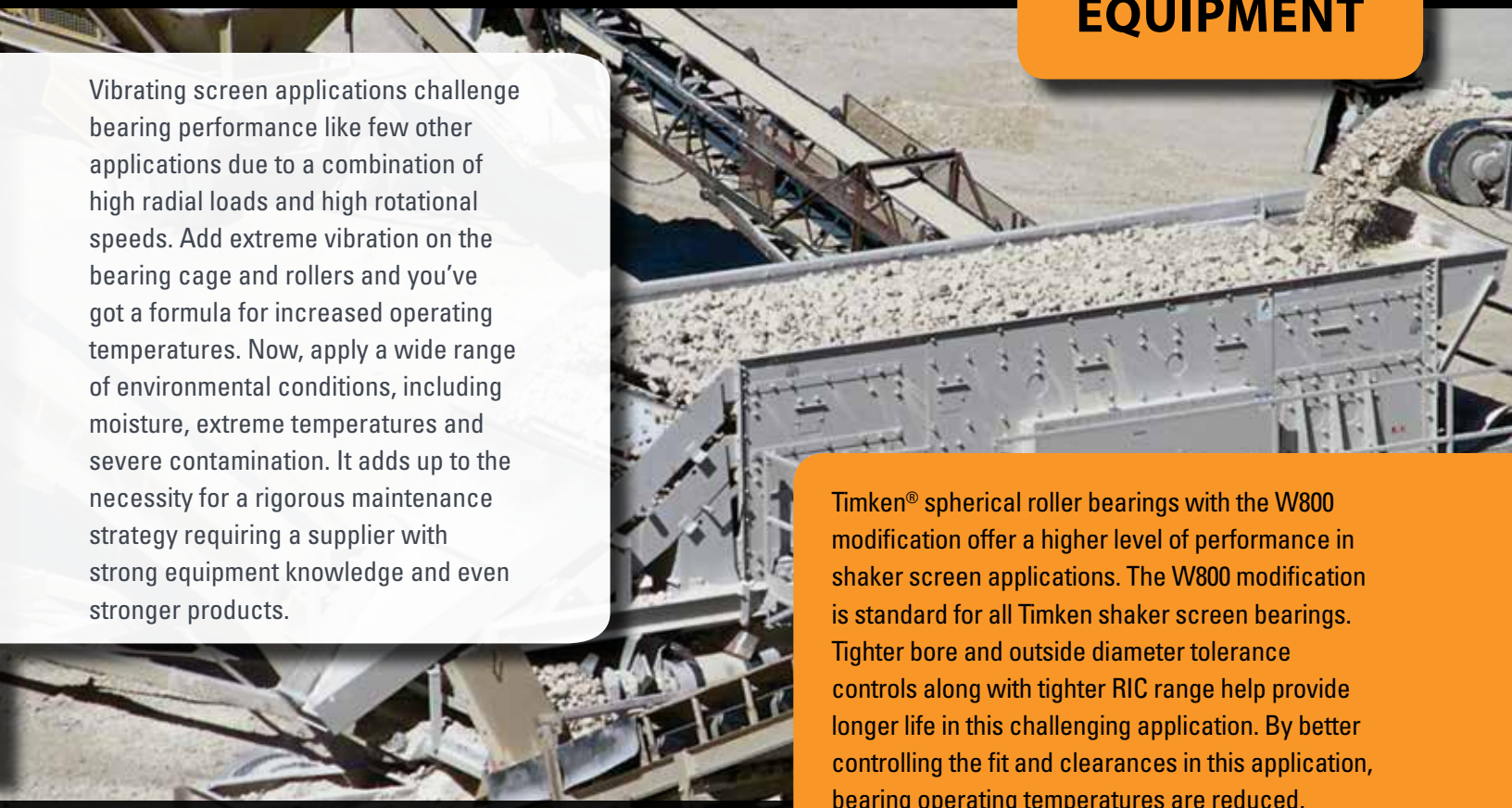
TIMKEN SOLUTION SUCCESS:
In-depth Analysis Crushes Unplanned Downtime

When Lippmann-Milwaukee Inc., a builder of crushing equipment for the mining and aggregate industries, started experiencing trouble with the frame bearings in its jaw crushers, managers reached out to Timken for a solution. Engineers from Timken and Lippmann-Milwaukee worked together to identify the root cause for pre-mature bearing damage in their 4248 and 3862 models. They discovered users had found a means to run more horsepower through the units. That meant larger and harder material was being sent through the crushers than the equipment had originally been designed to handle. The increased speeds were creating a low lubrication film condition that, when paired with the shock loads, was damaging the bearings.

Timken application engineers took the data collected from their work with Lippmann-Milwaukee and recommended a solution to accommodate the current crusher designs and the real-world demands placed on the equipment.

Applying a Timken® engineered surface to the rollers of the Timken® tapered roller bearings solved Lippmann-Milwaukee's problem. The deployed units displayed a marked improvement in service hours. The results convinced Lippmann-Milwaukee to specify Timken tapered roller bearings with engineered surfaces as standard for these equipment models.

VIBRATING EQUIPMENT

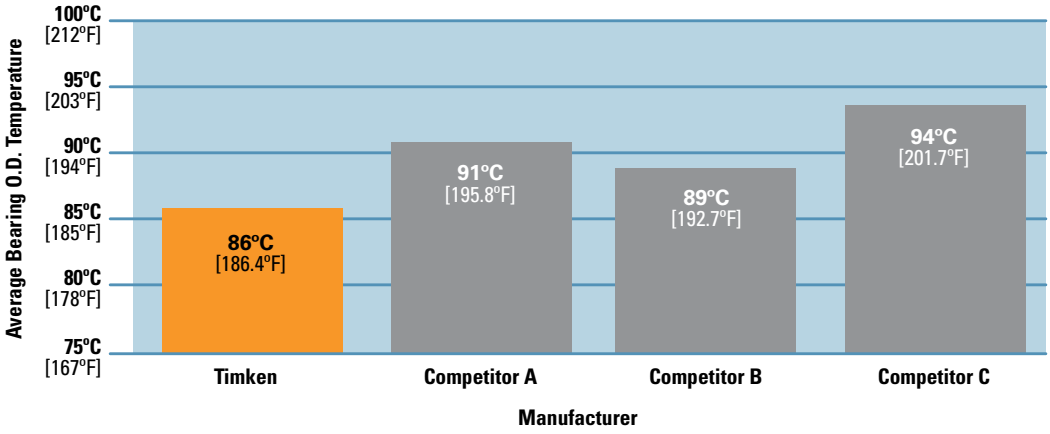


Vibrating screen applications challenge bearing performance like few other applications due to a combination of high radial loads and high rotational speeds. Add extreme vibration on the bearing cage and rollers and you've got a formula for increased operating temperatures. Now, apply a wide range of environmental conditions, including moisture, extreme temperatures and severe contamination. It adds up to the necessity for a rigorous maintenance strategy requiring a supplier with strong equipment knowledge and even stronger products.

Timken® spherical roller bearings with the W800 modification offer a higher level of performance in shaker screen applications. The W800 modification is standard for all Timken shaker screen bearings. Tighter bore and outside diameter tolerance controls along with tighter RIC range help provide longer life in this challenging application. By better controlling the fit and clearances in this application, bearing operating temperatures are reduced, helping to extend bearing life.

TIMKEN SOLUTION SUCCESS:
Cooler than the Competition

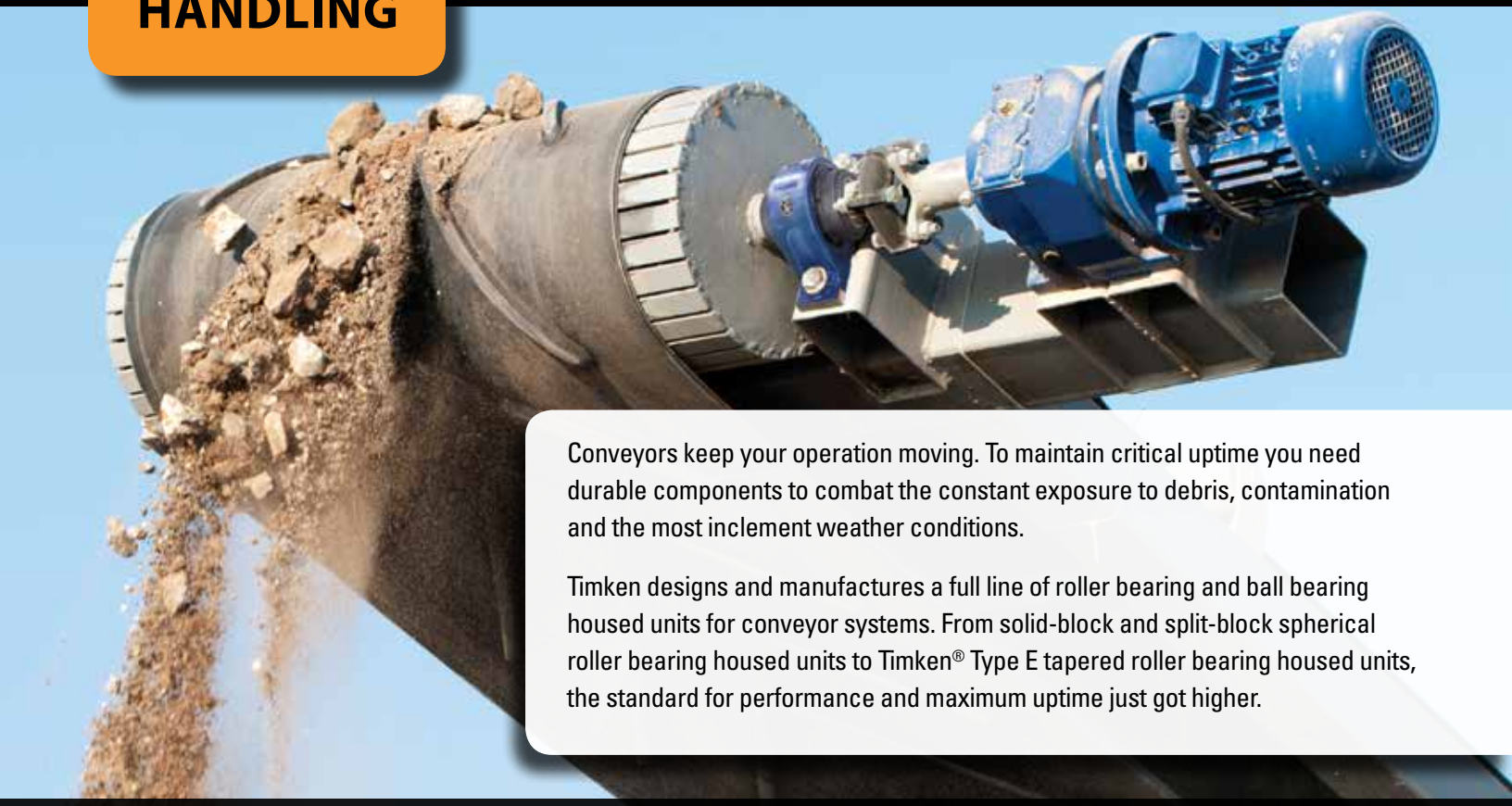
Lower operating temperatures increase bearing life by increasing lubricant life. A 5°C decrease in operating temperature can translate to 9 percent longer bearing life. In tests, Timken® spherical roller bearings ran at consistently lower temperatures than same-size competitive bearings.



Industry-leading Thermal Speed Ratings

The design of the next-generation Timken® spherical roller bearing delivers performance that meets or exceeds the average thermal ratings of industry competitors.

MATERIAL HANDLING



Conveyors keep your operation moving. To maintain critical uptime you need durable components to combat the constant exposure to debris, contamination and the most inclement weather conditions.

Timken designs and manufactures a full line of roller bearing and ball bearing housed units for conveyor systems. From solid-block and split-block spherical roller bearing housed units to Timken® Type E tapered roller bearing housed units, the standard for performance and maximum uptime just got higher.

TIMKEN SOLUTION SUCCESS:
Housed Units Shine at Gold Mine

Minerales de Occidente, a gold mine in Honduras, was ready to give up on one of its biggest machines. Their mobile crusher was down for about 90 minutes every 20 days because of bearing failure in the conveyor system.

Unable to find a solution using a competitive product, the mine's bearing supplier approached Timken. The application analysis results identified that the heavy loads and contamination were too much for the current bearing selection. Flange block housings that were designed to last 5,000 hours were lasting less than 500.

"The problem bearing was a ball housed unit, and Timken was able to provide a better alternative from our portfolio of spherical roller bearing solid-block housed units," said the Timken sales engineer. "They are made of solid steel and are rugged enough for punishing equipment like a mobile crusher."

Seven months later, the Timken flange block still worked as good as when it was new. The units utilize a triple-lip seal, which has proved to be superior to the competitive bearing in keeping contaminants out. In addition, it holds more than two times the weight of the old bearing, with an expected design life of 100,000 hours.

The mine has since added the Timken flanged units to another conveyor that was reinstalled. It had previously been disabled due to ongoing maintenance issues. Using Timken housed units has paid off for the mine. It has avoided the cost of a major investment and $580,000 a year in maintenance and bearing replacement costs.

Choosing the right type of bearing and housing for your material handling equipment can strengthen the performance of your equipment and bottom line. Timken® offers you a full line of housed unit solutions to suit your specific needs.

BEARING AND HOUSING GUIDE

	SNT/SAF Plummer Block Housed Units	Spherical Roller Bearing Solid-Block Housed Unit	Type E Tapered Roller Bearing Housed Unit	Ball Bearing Housed Unit
Bearing Insert	High performance spherical roller bearing with tapered bore or straight bore option	High performance spherical roller bearing with six shaft locking options	Tapered roller bearing with enhanced internal geometries	Ball bearing with superfinished raceways and three-shaft locking options
Housing	• Split, two-piece design • Cast iron (cast steel and ductile iron available)	• Solid block, one-piece design • Cast steel • Machined feet for consistent housing location	• Solid block, one-piece design • Cast iron	• Solid block, one-piece design • Cast iron

Seal Options	• SAF comes standard with labyrinth (LER) seals, options include Timken Guard (superior protection against contamination), dustac and taconite
	• SNT options include double-lip, labyrinth, V-ring, and taconite
		• Six seal options
		  • 3 triple-lip seal options (superior protection against contamination)
		  • 2 double-lip seal options
		  • 1 labyrinth seal option (for high-speed applications)
		• Auxiliary steel end covers available
			• Double-lip seal (standard) designed for optimized lip contact	• Single-lip (standard)
				• Triple-lip (superior protection against contamination
				• Labyrinth (for high-speed applications)

Additional Features	• Push/pull-type adapter sleeves available
	• Components interchangeable with industry standard designs
	• May be ordered as an assembly or as individual components
		• Multiple options to lock bearing to shaft
		  • Eccentric lock
		  • Set screw lock
		  • V-lock
		  • Tapered adapter lock
		• Double adjustment nut for fixed to float conversions
			• Available with set screw locking
			• Elecrto-coat paint for additional corrosion protection
			• Enhanced bearing geometries deliver highest dynamic load ratings in the industry
				• Available with Shaft Guard Technology
				• Available with wide or narrow inner rings
				• Variety of shaft locking options
				  • Set screw locking
				  • Eccentric locking
				  • Concentric locking

Benefits	• Easy-to-remove cap for bearing inspection
	• Housings may be re-used
	• Easily converts from fixed to float in the field
	• High performance Timken® spherical roller bearing runs cooler for longer bearing life
		• Quicker installation time than split housings
		• Easily converts between fixed and float positions after installation
		• High performance Timken spherical roller bearing runs cooler for longer bearing life
			• Quicker installation time than split housings
			• Increased useful bearing life and load capacities
			• Double-lip provides industry leading protection against contamination
				• Unique Shaft Guard Technology
				  • Eases removal and simplifies replacement
				  • Extends shaft life
				• Multiple sealing options provide choices to meet application needs

TIMKEN SOLUTION SUCCESS:
Solid-Block Housed Unit Multiplies Uptime



When New Clydesdale Colliery in Mpumalanga, South Africa, an EXXARO location, experienced premature bearing damage on the tail pulleys of its conveyor system, operators challenged their bearing distributor to find a solution. The distributor asked Timken to help meet the challenge in an application where the competitor's bearing was failing.

"We were getting eight weeks maximum bearing life with our previous solution. From fractured housings to seal failure and higher-than-normal maintenance cycles, the issues ran the gamut," said Frans Botha, mechanical foreman at New Clydesdale. "Timken presented the SRB solid-block housed unit as a potential solution and we gave it a try. We saw benefits right from the start. It took us approximately 30 minutes to install each unit, compared to an hour and a half normally required to reinstall the previous split-block units. Now, 10 months later, the original units are still running and our maintenance cycles have been reduced significantly."



Fractured competitor housing led to unplanned replacement of housed unit.



Timken solid-block spherical roller bearing housed unit steps in to meet the challenge.

BEARING & GEARBOX REPAIR



Highly engineered and relied-upon equipment components like bearings and gears can be expensive to replace. Why not save on lead times and budget by repairing and reusing existing components?

Through the process of remanufacturing and repairing bearings, Timken can increase the useful service life of the original bearing by up to three times and save you up to 60 percent of the cost of buying a new bearing. We perform repairs on any brand and type of bearing up to 2,134 mm (84 in.) outside diameter.

With the acquisition of Philadelphia Gear® products and services, Timken also provides gearbox solutions used in mines, quarries and refineries. That includes gearbox repairs and rebuilds by gearbox experts who share the same mission with you – to maximize your uptime and increase profits.

TIMKEN SOLUTION SUCCESS:
Repair Saves Time, and Time is Money

In steep angle slope and overland conveyors, an instantaneous reverse of tension can be fatal to the belt. Constantly replacing those belts is frustrating, time-consuming and very expensive. Our technical team used its vast engineering expertise in designing Philadelphia Gear® products to improve belt reliability on the highest tension, steepest angle slope belt conveyor in the Americas.

Flywheels are typically used to prevent belt failure in the event of a power or prime mover failure. By mounting the flywheel on the high-speed shaft behind the first-stage pinion, our gear services team was able to reduce the flywheel mass compared to those mounted to the intermediate or low-speed shaft.

In addition to improving belt reliability, this reconfiguration reduced the amount of required maintenance in two ways. First, it eliminated the need for another assembly to be mounted on its pillow block bearings. Second, the change eliminated a coupling connection and a set of support bearings, dramatically reducing the complexity of equipment alignment.



Tapered Roller Bearings

Timken sets the industry standard 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: Primary Crushing Equipment, Secondary Crushing Equipment, Vibrating Screens, Conveying Equipment

Debris-Resistant Bearings

- Timken® debris-resistant bearings extend bearing life up to 3.5 times and are designed for tough, dirty conditions
- Proprietary alloy heat-treatment modifications and diamond-like coating technology interrupt adhesive wear and can self-repair microcracking
- Advanced manufacturing processes make these bearings economical in both large and small quantities

Applications: Primary Crushing Equipment



Cylindrical Roller Bearings

The full range of Timken® cylindrical roller bearings includes single- and double-row configurations. The EMA series offers greater performance than the leading high-performance industry designs.

- Designs provide option to manage axial loads in either one or both directions, or permit axial float in both 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 lube flow results from the open-pocket cage design, as well as lubrication holes and grooves
- The complete line of Timken caged and full complement CRBs include single- and double-row designs
- Size range: 60 mm ID to 1,800 mm OD (2.4 in. ID to 70.9 in. OD)

Applications: Secondary Crushing Equipment, Vibrating Screens



Spherical Roller Bearings

Timken® spherical roller bearings manage high radial loads even in the presence of misalignment, marginal lubrication, contamination, extreme speeds or critical application stresses.

- Higher load and speed ratings provide enhanced performance levels as the result of optimized internal geometry and improved surface finishes
- Slotted cage made of hardened steel improves lubrication flow for lower operating temperatures leading to increased bearing life
- Timken spherical roller bearings offer a 17 percent increase in average thermal speed ratings over previous designs
- Available with rugged steel (EJ series) and machined brass retainers (EM or EMB series)
- Size range: 25 mm ID to 1,800 mm OD (1.0 in. ID to 70.9 in. OD)

Applications: Secondary Crushing Equipment, Vibrating Screens, Conveying Equipment



Timken® Type E Tapered Roller Bearings Solid-Block Roller Housed Units

Timken® Type E tapered roller housed units are built for rugged applications.

- Enhanced surface textures and profiles on the Type E bearing insert provide more than 200 percent increased design life over standard Timken bearings
- Significantly reduced contamination ingress and improved grease retention are the result of double-lip seals featured on the Type E
- Better corrosion resistance helps protect the collar and housing with electro-deposition paint coating
- Available in a full range of housed units, including pillow blocks, flanges and take-ups
- Bore size range: 35 mm to 125 mm; 1-7/16 in. to 5 in.

Applications: Conveying Equipment



Timken® Spherical Roller Bearing Solid-Block Housed Units

Timken® spherical roller bearing housed units combine cast steel housings with high-performance spherical roller bearings for outstanding reliability and durability in rugged conditions.

- Multiple layers of primary and secondary sealing options, as well as steel covers in sizes to fit all units, help protect bearings
- Timken spherical roller bearing housed units run efficiently on misaligned shafts up to +/-1.5 degrees without a reduction in life expectancy
- Spherical roller bearing housed units feature 15 sealing and four locking collar options
- Bore size range: 35 mm to 180 mm; 1-7/16 in. to 7 in.

Applications: Crushing Equipment, Conveying Equipment



SNT/SAF Split-Block Housings

Timken® SNT/SAF split-block units include a wide range of tough housing designs, seals and accessories for outstanding performance in a compact package.

- Units contain Timken spherical roller bearings with a unique design allowing them to run cooler and more efficiently
- Wide range of options provides effective sealing and lubrication for different operating conditions and speeds
- Available in tapered bore or straight bore designs. Readily converts from fixed to float by removing the stabilizing ring
- Bore size range: 20 mm to 380 mm; 1-7/16 in. to 19-1/2 in. bore

Applications: Conveying Equipment, Crushing Equipment



Ball Housed Units

Timken® ball bearing housed units feature robust housings, bearings and seals designed to offer a rugged, reliable product.

- Housings are wider along shaft axis and 30 percent heavier than previous designs to offer better bearing seat strength
- Corrosion-resistant housings coated with black powder epoxy offer excellent performance
- Timken problem-solver series offers solutions for the most challenging environments
- Available in many configurations, including wide and narrow inner rings and stainless steel housings. A variety of locking systems includes eccentric locking collars, concentric locking collars and set screws
- Bore size range: 17 mm to 75 mm; 1/2 in. to 3 in.

Applications: Conveying Equipment

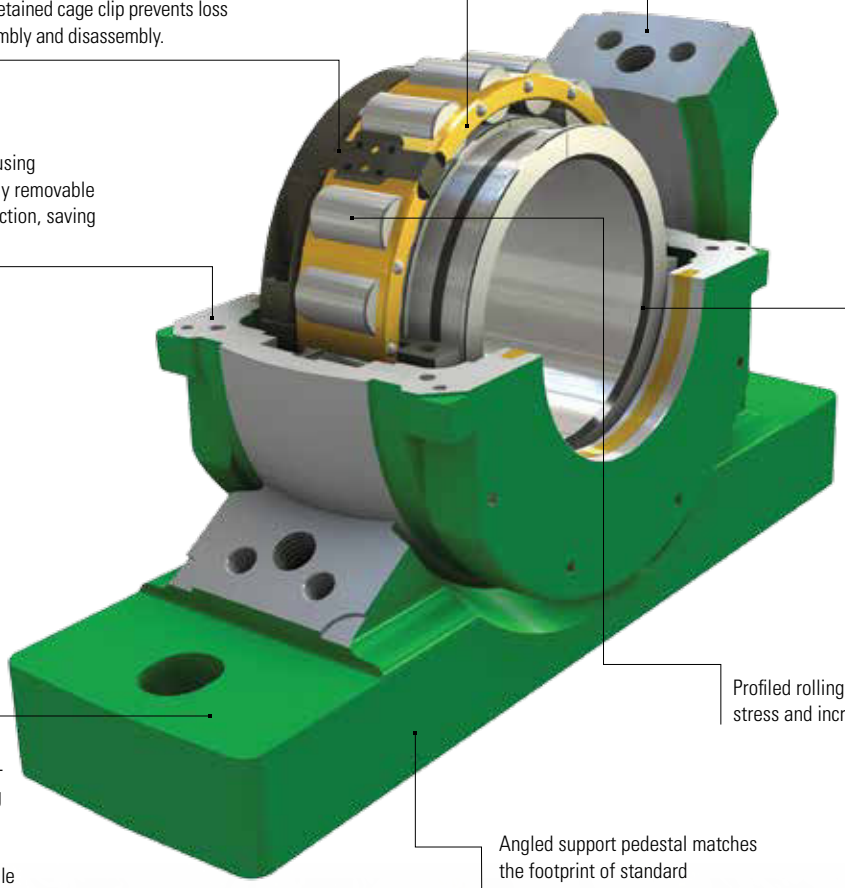
Timken® Revolvo Quick-Fit™ Housed Units

Timken® Revolvo Quick-Fit™ split cylindrical roller bearings are engineered for reliability and performance. They reduce downtime and service costs required to install, replace and maintain bearings in difficult-to-access or trapped locations.

Since 2011, the first-of-its-kind angled support pedestal of Quick-Fit housed units makes installation even easier for applications with low clearance between the base and the center of the shaft. The angled pedestal allows the drive to stay connected during installation. There's no need to re-position or lift the shaft.

Applications: Crankshafts, Fans and Blowers, Gearboxes and Transmissions, Motors, Pumps and Pump Drives, Conveyors, Elevators, Screw Conveyors, Ball Mill Drives, Ball Mill Trunnions, Crushers, Drum Drier Trunnions, Kiln and Mill Carrier Rollers, Kiln and Mill Drives, Mixer Drives and Washers

Quick-Fit: Technical Features





Bearing Repair and Remanufacture

Timken remanufacture and repair experts can return most brands of bearings to like-new condition, increasing service life by up to three times and saving customers up to 60 percent of the cost of buying new. Repairs are possible on a variety of bearing types and sizes up to 2,134 mm (84 in.) outside diameter. For the aggregate industry, Timken repairs tapered, cylindrical and spherical bearings, shafts and housings used in haul trucks, shovels and conveyors.



Gearbox Repair

Philadelphia Gear® products are known for their quality and gearbox performance. With expansive knowledge that covers a vast area of the industrial gearbox realm, including crusher drives and variable speed drives, the gear services team has the experience necessary to assist with both mechanical gear repairs and industrial gearbox leaks.



Service Engineering

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

Training and Certification

Timken Service Engineering provides well-respected bearing maintenance training programs in the aggregate industry. Timken maintenance training covers all bearing types, is 100-percent technical in scope and includes both pre-tests and post-tests to assure students understand the concepts presented. Timken training is modular, so it can be customized to fit the students' needs precisely. Seminars range from two hours to



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. three days.



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 now manufactures chains that stand up to virtually any environment. Timken® chains are built to precise specifications for strength and maximum wear life.

- Offering includes a complete line of roller chains, attachment chains and engineered class chain available to handle extremely challenging environments
- Stacker-reclaimer chains are engineered for optimum wear life including induction hardening of the sidebar wear surfaces
- Size Ranges: Precision roller chain sizes (60 through 240 including multi-strands); engineered class chain is built to your specification



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

The eight primary lines of Timken lubricants complement the G-Power and M-Power single-point lubricators, C-Power centralized multi-point lubricators and global offering of lubrication products. G-Power, M-Power and C-Power units 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.



Customers bring Timken their greatest challenges, and we deliver. The global Timken team leverages our engineering expertise and vast field experience to provide solutions that let you operate more 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 high-performance mechanical components, including bearings, gears, belts, chain and related mechanical power transmission products and services.

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

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