TIMKEN



Engineered Solutions for the Aerospace Industry

Manufacturing high-performance bearings for some of the world's most demanding applications

With proven solutions in both commercial and defense markets – including fixed wing, rotorcraft and space applications – Timken collaborates with original equipment manufacturers (OEMs) in the aerospace industry to manufacture high-performance bearings for the world's most demanding applications.

For this reason, you'll find Timken® bearings in iconic designs throughout history – ranging from early commercial aircraft like the Ford Trimotor and Blackhawk helicopters to the James Webb Space Telescope and Mars rover.

While every aerospace application faces its own unique performance demands, they all have one thing in common: Bearing damage is not an option. In these high-stakes applications, OEMs know they can depend on Timken for engineering expertise and manufacturing excellence.



Timken Advantages

- **Engineering support.** Whether you're engineering bearings for a new aerospace application or working to improve upon an existing design, Timken's highly-experienced sales, service and application engineers become an extension of your team.
- **Application analysis.** Using our advanced bearing system analysis tool, Syber™, our application engineers can predict factors such as bearing life, heat generation, deflection and internal stresses.
- **Reliable performance.** Timken's depth of experience in commercial and military aerospace applications positions us to tackle solutions that accommodate extremes of temperature and humidity.
- **Sales and service support.** The Timken team is dedicated to supporting aerospace customers at every stage of the product development process – from application engineering and robust product launches to supply chain and end-user customer service.
- **Manufacturing excellence.** We deliver products with precision and reliability through our clean room manufacturing standards, enhanced coatings and bearing customization. Additionally, we strive to meet aerospace demands by offering a broad line of tapered roller and hybrid bearings.

Gain Solutions That Can Help:

Increase performance.
Our leading-edge hybrid bearings use advanced ceramics and high-density, super-clean steel alloys to reduce weight, improve resilience and increase performance.

Ensure quality.
When you select Timken bearings for your aerospace application, you can trust that they have met our rigorous quality standards during every phase of the manufacturing process – including AS9100.

Simplify ordering.
We work with you on how and when you want to order. Our internal processes help us forecast, understand and manage your product demand to set the appropriate and best levels of inventory – helping us deliver product when you need it.

Improve maintenance operations.
Timken's training program can instruct your maintenance team on the ins and outs of aircraft landing wheel bearing maintenance – to help improve aircraft safety, extend bearing performance and reduce unnecessary replacement costs.

An Ideal Fit for Aerospace Applications

Applications	Timken Solution	Advantages
		Fixed Wing
Landing Wheels	Timken 629 code Tapered Roller Bearings	• Extensive application knowledge and performance experience • Can withstand very high contact stresses under the challenging duty cycles and extreme loads of landing wheels • Product enhancements to reduce the potential for scuffing and scoring, and reducing torque and heat, and bearing damage
Auxiliary Power Units	Timken Aerospace Ball Bearings and Cylindrical Roller Bearings	• Designed with precision for high speeds • Manufactured with high temperature alloys suitable for high operating temperatures
Engines	Timken Aerospace Ball Bearings and Cylindrical Roller Bearings	• Designed with specialty alloys for high temperatures • Highest available material cleanliness • Special heat treatments including vacuum carburized and duplex hardening • Ceramic hybrids for high-speed capability and lower weight
Gearboxes Starters and Generators	Timken Aerospace Ball Bearings, Cylindrical Roller Bearings and Tapered Roller Bearings	• Wide range of Aerospace-specific bearing types including hybrids for lower weight and optimal performance • Compliant to Aerospace quality standards
Actuators	Timken Aerospace Ball Bearings and Cylindrical Roller Bearings Aurora Rod Ends and Spherical Plain Bearings	• Wide range of Aerospace-specific bearing types for lower weight and optimal performance • Compliant to Aerospace quality standards
		Rotorcraft
Engines	Timken Aerospace Ball Bearings and Cylindrical Roller Bearings	• Designed with specialty alloys for high temperatures • Highest available material cleanliness • Special heat treatments including vacuum carburized and duplex hardening • Ceramic hybrids for high-speed capability and lower weight
Transmissions	Timken Aerospace Ball Bearings, Cylindrical Roller Bearings and Tapered Roller Bearings	• Engineered for the lowest weight solution • Designed with alloys with high temperature capabilities for hardness and dimensional stability • Light-weight through power dense solutions for tapered roller bearings • Ceramic rolling elements for tapered, cylindrical and ball hybrid bearings
Swash Plates	Large Thin Section Ball Bearings	• Engineered for load/case duty cycle • Corrosion-resistant alloys and/or sealed solutions available for harsh environments
Main Gearbox/Rotor Mast	Large Timken Aerospace Cylindrical and Tapered Roller Bearings	• Wide range of Aerospace-specific bearing types including hybrids for lower weight and optimal performance • Compliant to Aerospace quality standards • Accommodates slower speed with higher loading
		Space
Attitude Control	Miniature Precision and Thin Section Ball Bearings	• Extremely high precision for low error motion, low transmitted vibration and high reliability • Products engineered for extremes of space including operating in a vacuum and wide temperature ranges • Clean room assembly for very low contamination and outgassing
Solar Array Drive	Miniature Precision and Thin Section Ball Bearings	• Complex bearings and shafts assemblies with stringent requirements • Clean room assembly for very low contamination and outgassing • Compliant to Aerospace quality standards and documentation
Deployment Mechanisms	Miniature Precision and Thin Section Ball Bearings	• Very high stiffness in small cross section, light weight • Engineered with dry film lubricants to operate in extremely cold environments • Contact stress analysis performed to ensure proper operation
Gimbal Assemblies	Thin Section Ball Bearings	• Very high stiffness in small cross section, light weight • Bi-directional stiffness with precision movement
Payload	Miniature Precision and Thin Section Ball Bearings	• Engineered for low and steady torque • Extremely high precision for low error motion, low transmitted vibration and high reliability • Products engineered for extremes of space including operating in a vacuum and wide temperature ranges • Clean room assembly for very low contamination and outgassing

TIMKEN

The Timken Company partners with customers to design and manufacture advanced motion technology systems and components for critical end markets including aerospace and defense, power and electrification, and automation and industrial solutions. With more than 125 years of specialized engineering expertise, we power performance across the application lifecycle.

www.timken.com

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