

Crossed Roller Bearings: Features and Applications

If your application requires precise rotary motion and space savings, upgrade your design to IKO Crossed Roller Bearings.



When your machine design requires rotational mechanisms to handle complex loads and position an object, there's no doubt precision and small size will be among your most significant criteria when choosing a bearing. IKO Crossed Roller Bearings (CRBs) satisfy all these requirements and more to enable reliable and highly functional complex motion for a growing number of applications. If you're challenged by a machine design or motion profile with limited installation space, a crossed roller bearing is an excellent choice.

Crossed roller bearings have a unique design with rollers alternately crossed at right angles to each other between inner and outer rings. This arrangement creates greater roller contact with the raceways, allowing bearings to take radial,

thrust and moment loads from any direction at the same time to minimize deflection.

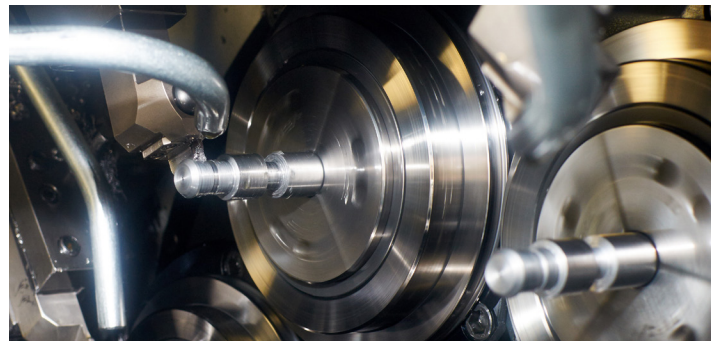


Figure 1. Crossed roller bearings are used in spindle heads and other rotating parts in machine tools and CMM machining centers.



A Growing List of Applications

Crossed roller bearings perform for all types of load conditions and excel under most operating speeds. Here are just some of the applications where you'll find crossed roller bearings:

- **Robots.** As robots evolve to perform an ever-growing diversity of tasks, they present machine designers with varying motion requirements that can include heavy or light-duty load handling as well as the ability to perform sophisticated tasks in less space. Not only do CRBs exhibit rigidity, smooth motion and accuracy, these low-cost joints are available in a wide choice of sizes and constructions to fit various rotating mechanisms.
- **Machine tools.** Crossed roller bearings provide accurate, smooth motion for spindle heads and bearing shafts.
- **Life sciences and medical.** You'll find many crossed roller bearings that can fit into the small mechanisms or articulating arms that position and rotate objects in the lab. And, their high precision makes them particularly desirable for indexing tables found in blood centrifuges. To achieve optimal smoothness, CRBs can be configured with separators. IKO's CRBT Series is an example of a crossed roller bearing that combines compact and slim dimensions with smooth, rotating motion.
- **Semiconductor and electronics fabrication.** Crossed roller bearings deliver micron-scale accuracy that the semiconductor industry demands for pick-and-place systems and wafer handling equipment. They can also be configured for cleanroom environments.
- **Military and aerospace.** The military and aerospace sector abounds with machinery that incorporates rotating motion to move objects. For example, crossed roller bearings are well-suited for airplane seat adjustment mechanisms thanks to their high load capacity, high accuracy and rigidity. They are also used in ground based radar systems, and their small size also makes them ideal for swivel mechanisms in military surveillance cameras. With modifications to withstand vacuums and low-temperatures, CRBs can operate reliably aboard spacecraft.
- **Food and beverage.** Spindles in food slicers and food processors require accuracy, durability and cleanliness. Crossed roller bearings, when used with food-grade greases, can provide rigidity, accuracy and load capacity without contaminating the food products. IKO offers stainless steel crossed roller bearings upon request.
- **Other.** Crossed roller bearings can be found wherever there is a need for handling complex loads with high accuracy despite limited space availability. Versatile IKO Crossed Roller Bearings have recently been implemented in these diverse applications:
 - **Exoskeletal robots.** In one exoskeletal device for physical therapy, IKO Crossed Roller Bearings carry large moment loads so the exoskeleton can move coaxially with the patients' skeletal structure as they move their arms. This motion helps stroke survivors correct impaired neuromuscular functions.
 - **Stretching film machine.** Our crossed roller bearings are used in machines that manufacture high volumes of polyethylene construction film products.
 - **Automated food shopping.** A novel picking system that is part mobile robot and part vertical lift moves groceries from station to station at different elevations with IKO Crossed Roller Bearings clamped to its rails.



Figure 2. IKO Crossed Roller Bearings carry high moment loads in a physical therapy exoskeletal robot that helps stroke patients relearn shoulder movement.



There's a Crossed Roller Bearing That Suits Your Application

Because each application comes with its own requirements and challenges, crossed roller bearings come in a variety of styles. IKO International offers the following types of crossed roller bearings:

- **Standard.** Designed for easy handling, standard crossed roller bearings have an outer ring made of two split pieces that are bolted together to prevent separation during transportation or mounting. Two particular series — the CRB and CRBC — are ideal for applications requiring large shaft diameters.
- **Mounting-holed type.** The inner and outer rings of these crossed roller bearings have mounting holes, thereby making special housings or fixing plates unnecessary. This combination of pre-drilled holes and one-piece construction virtually eliminates mounting errors.
- **High rigidity.** This type of crossed roller bearing is appropriate for applications with high rotational speed that also demand greater accuracy. The inner and outer rings have a solid one-piece construction to achieve high rigidity while also reducing mounting errors. Separators are incorporated between the cylindrical rollers to ensure smooth rotation.
- **Slim type.** These bearings have a small outside diameter, compared to the bore diameter, and a narrow width. Suitable for applications with comparatively high rotational speeds, customers can choose from caged, separator and full-complement units.
- **Super-slim.** Ideal for applications with tight space requirements, super-slim crossed roller bearings are just 5.5 millimeters high and 5 millimeters wide with separators between the cylindrical rollers. Not only do they keep machine designs small, they also improve driving power.

Work With a Crossed Roller Bearing Specialist

When it comes to specifying the right crossed roller bearing for the job, IKO is your ideal partner. Designed to provide rigidity, smooth motion and accuracy, our varied lineup of crossed roller bearings meets the needs of a wide variety of applications.

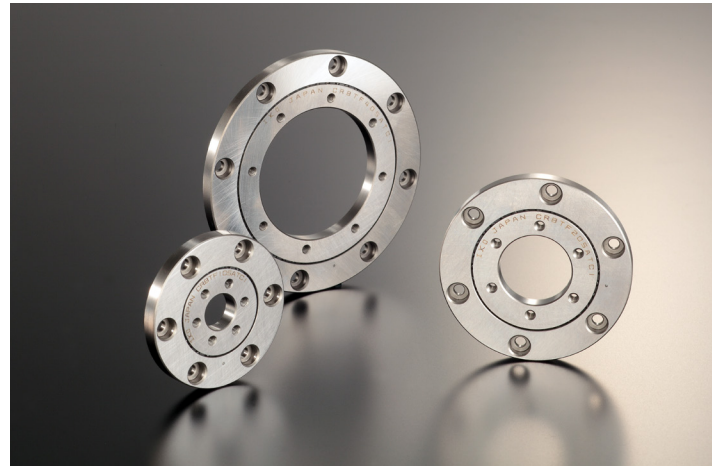


Figure 3. IKO's CRBT and CRBTF Crossed Roller Bearings measure just 5.5 millimeters high and 5 millimeters wide.

If a standard crossed roller bearing does not meet your application needs, our expert staff can work with you to engineer a solution. Leveraging our long history and expertise in producing high-precision motion components, we can adjust various geometries — such as adding a pilot diameter — to suit the application. And, we can modify the inner ring or drill and tap holes to further simplify mounting. With IKO's engineering, customers do not have to adapt their design to the bearing.

Many Applications Can Benefit From Crossed Roller Bearings

Crossed roller bearings are known for their integration in robotic joints with difficult motion and load requirements. However, many other mechanical designs can benefit from the rigidity, accuracy, speed and compact size that crossed roller bearings provide. IKO International's Crossed Roller Bearing lineup comes in a variety of sizes and designs to deliver these benefits to any mechanical system that must carry out complex rotary motion in a tight space.

For more information about IKO International's Crossed Roller Bearings, visit www.ikont.com.