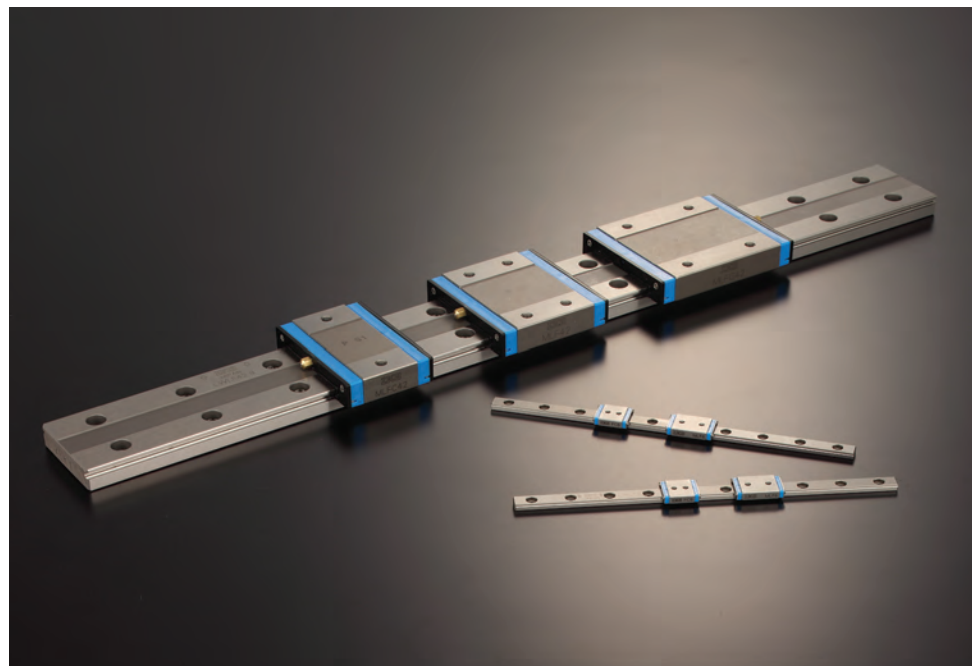


## Miniature Linear Bearings Offer Maximum Performance

In certain industries, components and machinery must be sized to the smallest dimensions possible to meet extremely demanding performance criteria. Many of these applications involving space constraints and limited movement are found in the semiconductor, medical, surgical, robotics and precision machinery arenas. For example, specialized equipment designed to handle delicate wafer fabrication, medical diagnostic procedures and surgical robotic needs often require the tiniest parts. This includes motion control components such as linear guides, which must be small enough yet strong enough to perform as needed with very little maintenance.

When bearing sizes range from 1 to 25 mm, load capacity and maintenance issues are often more pronounced than in larger units. IKO addresses these challenges with an integrated lubrication system and the use of specialized materials that promote corrosion resistance in its miniature linear guides. Here we take a look at some of the most important considerations to keep in mind when specifying miniature bearings.

**Zero Maintenance Lubrication.** In any moving system—especially those involving bearings—proper lubrication is a key concern. With smaller components and machinery, this is even more important due to the difficulty of relubricating areas that are hard to reach. IKO solves this problem in its line of miniature linear guides by using a built-in lubricating element called C-Lube to provide long lasting, maintenance free operation through capillary action.





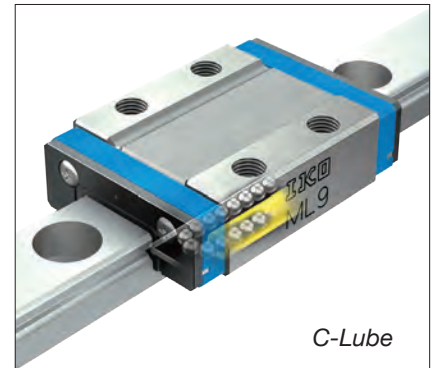
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## WHAT TO LOOK FOR IN MINIATURE BEARINGS

When specifying miniature linear guides, it is important to choose a bearing system that can offer enough flexibility in terms of sizes, materials and design features. Consider these options:

- Track widths from 1 to 42 mm
- Cut-to-order rail lengths
- Choice of up to 4 different carriage lengths per rail diameter
- Interchangeable components
- Stainless steel, carbon steel or ceramic balls
- Stainless steel or carbon steel rails
- Stainless steel end plates for high-temperature or -acceleration uses
- Robust load capacity
- Built-in lubrication system
- Corrosion-resistant coatings
- Nonmagnetic steel grades
- Ball-retaining bands to hold balls in place
- Installation options such as bottom-mounted threaded hole rails

C-Lube offers a controlled release of lubricant over 20,000 km of operation or five years, and this technology can be integrated into bearings as small as 3 mm wide. In addition, the C-Lube unit does not touch the track rail, enabling smooth motion without increasing rolling resistance. Keeping this friction to a minimum is especially important in applications involving high speeds and fast accelerations such as those found in semiconductor and electronics manufacturing.



C-Lube

**Multiple Sizes and Load Capacities.** When it comes to miniature linear bearings, sizes and load ratings are often limited to a handful of options. In contrast, IKO offers its standard miniature line in track widths from just 1 mm up to 25 mm, with wide carriages available to 42 mm. For additional flexibility, miniature carriages come in four lengths. For applications requiring higher load capacities, consider specifying a longer carriage that can house additional balls for extra stability.

By mixing and matching different track widths and slider lengths, it is possible to build a miniature bearing system to meet the exact requirements of practically any application that calls for a tiny linear guide. Further, just because sizes are small does not mean

## MINIATURE LINEAR BEARING APPLICATIONS

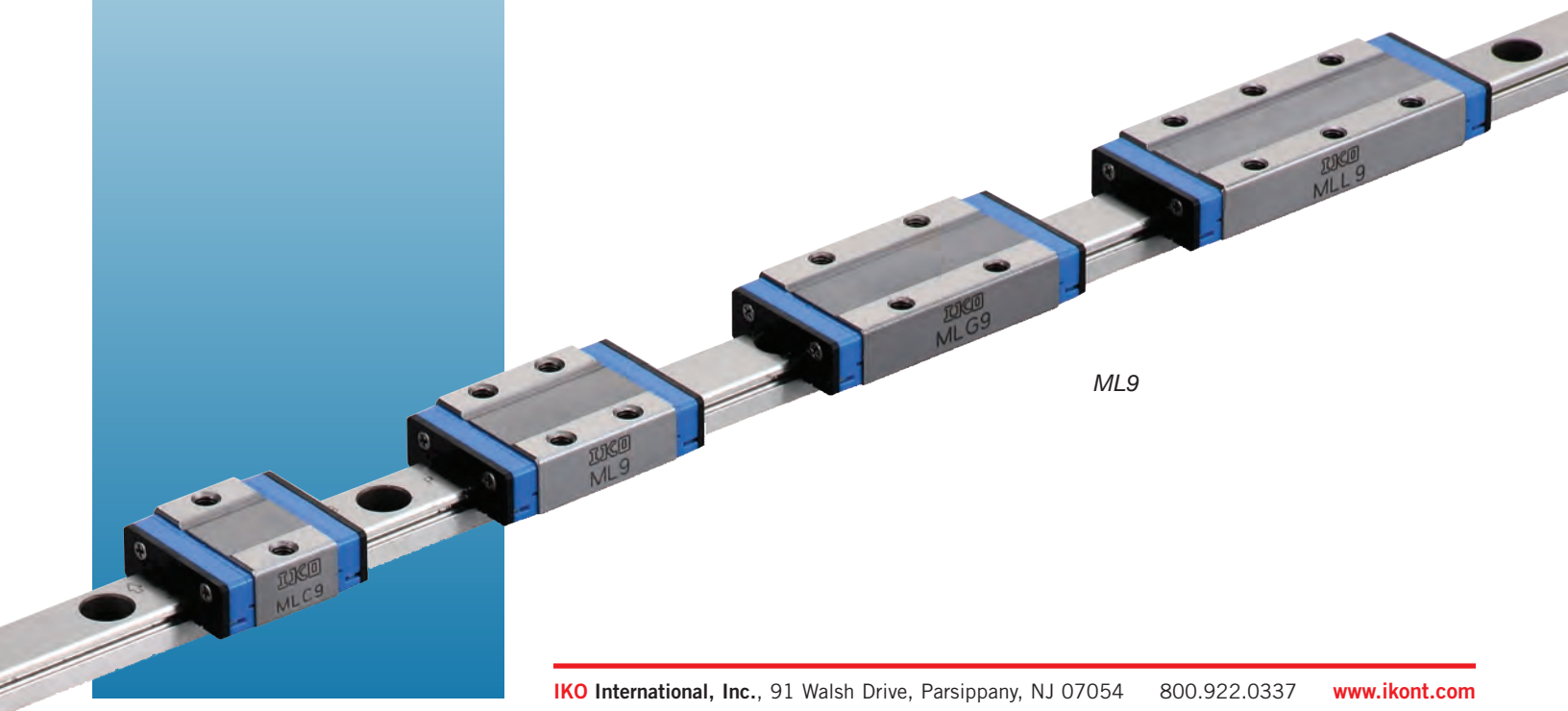
- Medical devices
- Surgical tools
- Life science equipment
- Robotics
- Semiconductor manufacturing
- Electronics manufacturing
- Precision machinery

that load capacities are diminished. For example, IKO's largest miniature guides feature dynamic load ratings of more than 16,700 N and moment load ratings higher than 320 N•m in the roll axis. Specifying a properly sized bearing system will help guarantee highly accurate machine motion with very little friction, which is critically important in applications such as medical and surgical tools that rely on extremely precise movements.

**High Performance Materials and Coatings.** Miniature bearings are often supplied “as is” with very few options available when it comes to material choices. When these options are limited, design engineers and machine builders are frequently left with two alternatives—over-specifying or under-specifying the components that comprise the larger system. When it comes to miniature linear guides, it is important to work with a supplier that can offer a variety of materials and finishes to meet the exact requirements of the application at hand.

For example, IKO offers its miniature guides with either stainless steel or carbon steel rails. Stainless steel enables use in clean rooms and other demanding environments, while high carbon steel models are designed for all-purpose use. Stainless steel end plates are also available for applications experiencing thermal extremes. In addition, a special grade of nonmagnetic steel is available for use in areas that are sensitive to magnetic fields such as certain medical and surgical equipment, including magnetic resonance imaging (MRI) machines.

The balls that reside inside the carriages are available in three materials as well—stainless steel, carbon steel and ceramic. In extremely humid conditions, even stainless steel can develop rust over time, which makes ceramic balls a better choice in this scenario. Other benefits of ceramic over stainless steel include exceptional performance with higher rigidity, less deformation, improved speed and reduced noise. Specialized coatings are another option to consider. In extreme environments facing high humidity or abundant moisture, corrosion-resistant coatings add an extra degree of protection for guide rails and housings. Coatings are easily specified and applied at the factory prior to delivery.



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**Interchangeable Components Add Flexibility.** When it comes to engineered systems comprised of several components, there is nothing worse than having to purchase a completely new setup after just one part fails. With this in mind, look for linear guide systems featuring interchangeable parts that can be mixed, matched and swapped out as needed. For example, IKO offers its slide units and track rails as separate components. If a bearing goes bad, simply swap out the failed slide unit with a new one. In addition to simplified maintenance, another aspect of interchangeability is the option to modify the guide system as necessary. Rail lengths can be cut to order and carriages may be added or removed from the track to build a flexible system that can evolve as manufacturing needs change.

**For more information on specifying your next miniature bearing application, contact the IKO engineering team at any time. Please visit [www.ikont.com](http://www.ikont.com) or call tel: 800.922.0337.**



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