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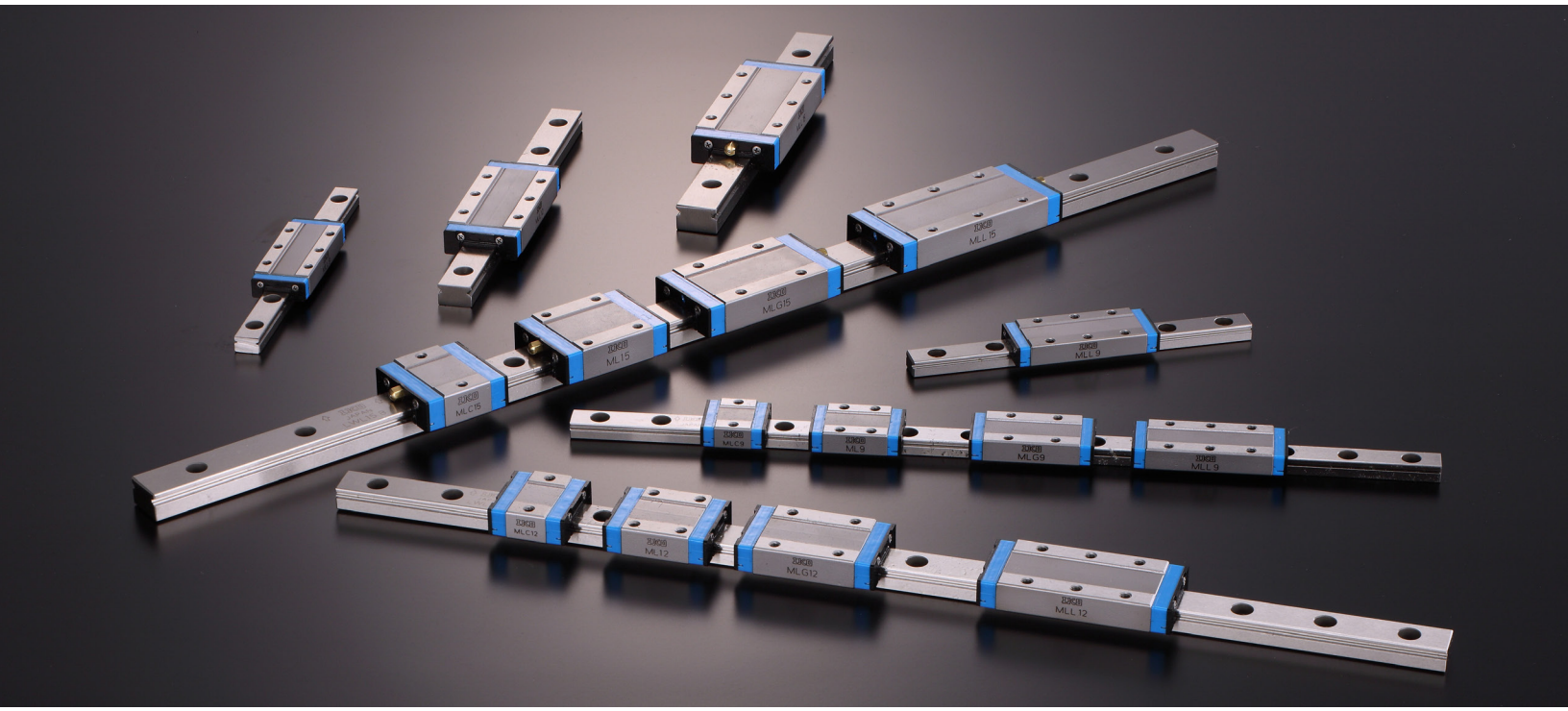
WHITE PAPER
2026

How To Apply Parallel Installation Fundamentals To Achieve Smooth, Accurate Linear Motion



Mounting parallel rails against a well-machined reference edge will provide the truest accuracy. However, you can also achieve good results using a temporary installation method in which the structure itself helps assure that the rails are parallel and properly aligned. By carefully following these methods and leveraging your bearing manufacturer's expertise, you'll be able to install a linear system that delivers optimal performance and reliability over a long lifetime.

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Why Is Mounting Accuracy Important for Linear Motion Systems?

In linear systems, the rail will conform to the mounting surface. If the installation involves multiple rails in parallel, it's critical that the mounting surfaces are accurate and the rails well-aligned to avoid binding, misalignment or other issues that will affect the system's performance. That means the mounting surface must be sufficiently flat and the shoulder straight for the accuracy you're trying to achieve.

In an ideal world, you would have the technical know-how, a well-machined reference edge or equipment bed, the proper tools and time for a job well-done. In the real world, you may not have all or any of those things.

The good news is that there are several ways to mount parallel rails accurately, even without a machined reference surface or much prior experience. This article will describe the basics and best practices for installing parallel rails along with tips and strategies for installations in less than ideal circumstances.

What Are the Essentials To Get Started Mounting Parallel Rails?

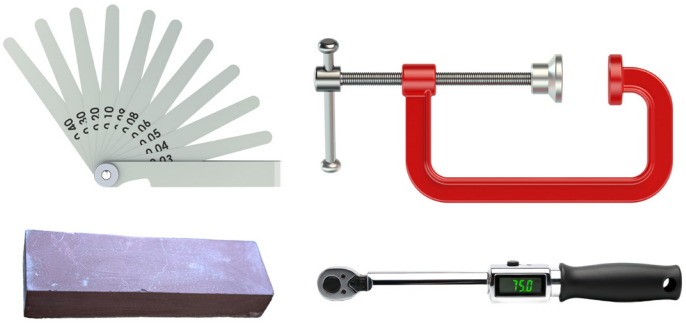
Regardless of your situation, there are some essential tasks you must take care of before getting started.

- **Make sure the reference bed and rail are clean and dry.** Remove all burrs and surface blemishes from the machine or device where the linear guide will be mounted. Wipe the surfaces with a clean cloth.
- **Clean the linear guide.** Use a clean cloth to remove any dust or rust-preventive oils from the guide.
- **Consult manufacturer information.** Keep in mind that the mounting surface has to be sufficiently rigid on its own to avoid deformation under the load. Also, flatness is especially important when mounting multiple rails in parallel since aligning the rails vertically is more challenging than horizontally. Motion component specialists like IKO publish tables in their catalogs, showing the recommended tolerances for flatness and parallelism, which can vary by size.

To Install Parallel Rails, Select These Tools

Under ideal circumstances, you'll have a full complement of tools to do the job. If you do not, workarounds are possible. With that in mind, we suggest having the following on hand:

- **Dial indicator** to find parallelism errors. Resolutions of 2 µm or finer are appropriate for high-precision installations.
- **A calibrated torque wrench** which tightens the rail bolts to a manufacturer's torque values to ensure proper holding downforce.
- **Clamps** to hold down the rails during installation.
- **Plus** a straight edge, feeler gauges, honing stone and clean cloth.



Tools typically used for parallel rail installation.

What Are the Two Most Common Ways To Accurately Install Parallel Rails?

It often comes down to the precision the job requires for accurate installation. If the motion system is intended to perform very precise movements in a critical application, it makes sense to use a reference edge on the machine or equipment bed along with the right tools to prepare, align and secure the rails. If the application does not require high-precision movements, an installer has some flexibility with respect to the mounting surfaces. If the project comes with cost concerns, there are alternatives to using a machined reference edge.

- **Use a Reference Edge.** While not mandatory, a reference edge is a well-established means of ensuring parallelism and straightness when mounting multiple rails, especially when the motion system is intended for high-precision applications. A reference edge can be defined as a precision piece that is machined into the equipment bed. With this arrangement, the rail butts up against the edge with a specially prepared mating surface. Installers can press the rail up to the reference surface, using clamps to hold it in place. This keeps the rail totally straight and exactly in line with the intended motion. From there, it's simply a matter of installing the screws.
- **A Relatively Simple Way: Let the System Do the Work for You.** Installers do not necessarily need a specially machined fixed shoulder to ensure parallel alignment or make adjustments to the secondary rail. For installers without the benefit of having the machining capabilities to create a specialized mating surface, a "temporary installation" can do the trick. By temporarily securing the secondary rail, an installer can make adjustments to the rail and align it with the primary rail, thereby achieving parallelism before the final tightening occurs.

  With a temporary installation, the installer clamps down the rail to the bed using a straight piece of metal as a shoulder. The assembly goes on top, and the platform can be moved back and forth by hand. This design lets the structure itself center the secondary rail, removing any concern about relying solely on the bolt pattern to clamp it in place without guaranteed perfect alignment. As the equipment slides on both rails, it moves the secondary rail gently into its centered position. Once you have cycled the carriage and moved it fully to one end, start at that end and tighten the first bolt. Then shift the carriage slightly, tighten the next bolt, and continue the process until all are snug. That's the benefit of temporary installation — it uses the structure to help make sure your rails are parallel, aligned and will perform at their best. And, once the rails are installed with everything tightened down, the temporary shoulder can be reused for another assembly, saving time and costs.

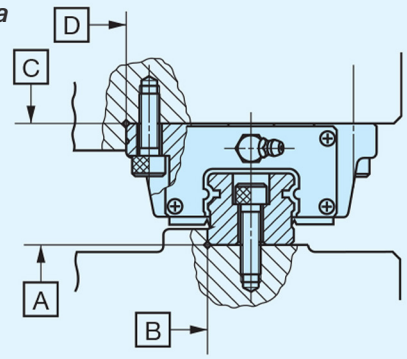
How To Bolt the Rails the Right Way

When it's time to install the rail, bolt the rails sequentially from one end of the rail to the other in one direction. Bolting the rails back-and-forth may create slight movement, although this is less likely when working with a reference mounting surface. Because rails can sometimes deform under force, use caution when tightening them. Too much torque can create internal stresses on the rail. Your bearing manufacturer can recommend an appropriate amount of torque to achieve sufficient holding downforce without overtightening the bolts. An ideal manufacturer will also provide secondary recommendations based on expected loads, vibrations and overturning moments. By following these practices, you can realize mounting accuracy, smooth operation and lifespan for your linear motion system.

What Are Some Typical Examples of Parallel Mounting Approaches?

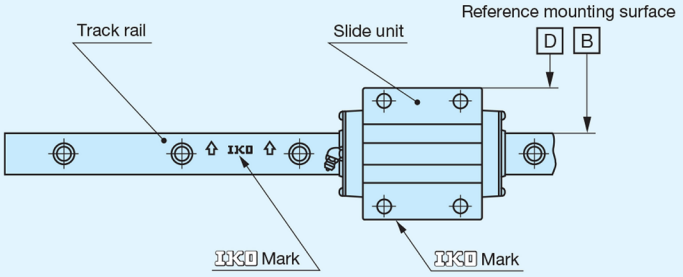
There are many ways to mount parallel rails, and manufacturers typically publish recommendations. However, manufacturers cannot account for every scenario in their publications. If your requirements are especially unique, contact your manufacturer for further assistance. Here are just some of the ways you can mount parallel rails, using IKO's recommendations as examples.

Example 1a



Reference mounting surface and typical mounting structure of IKO Linear Way and Linear Roller Way.

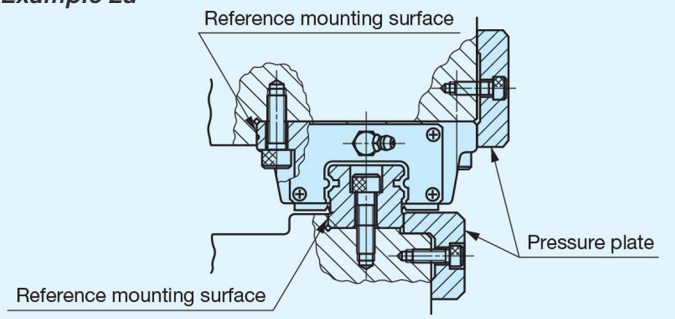
Example 1b



Position of reference mounting surface of IKO Linear Way and Linear Roller Way. (Representative example)

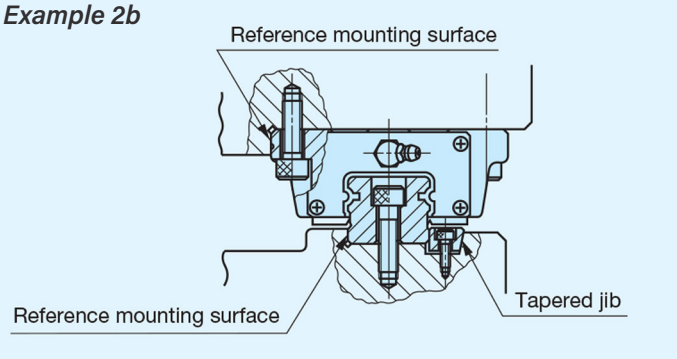
Note: With IKO linear guides, the reference mounting surface of the slide unit is the opposite side of the "IKO" mark. The track rail reference mounting surface is identified by locating the "IKO" mark on the top surface of the track rail. It is the side surface above the mark in the direction of the arrow.

Example 2a



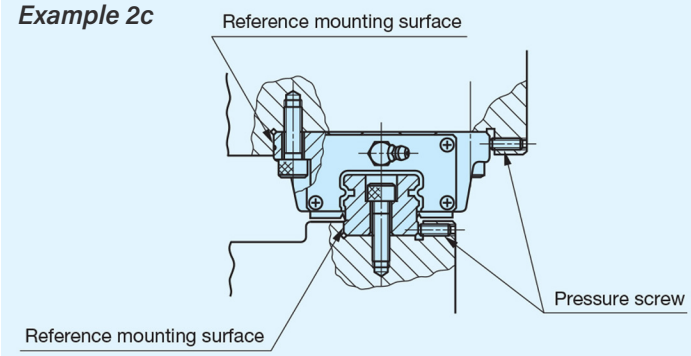
Mounting example with pressure plate.

Example 2b



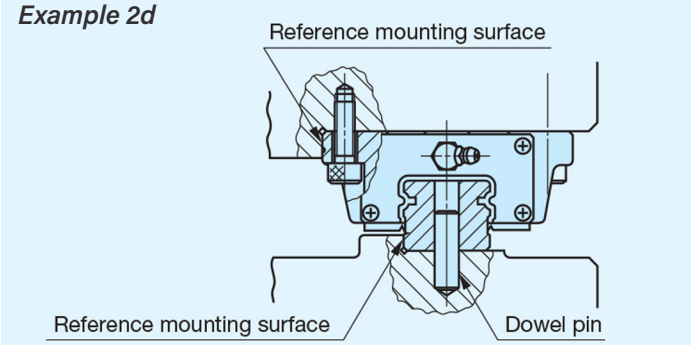
Mounting example with tapered jib.

Example 2c



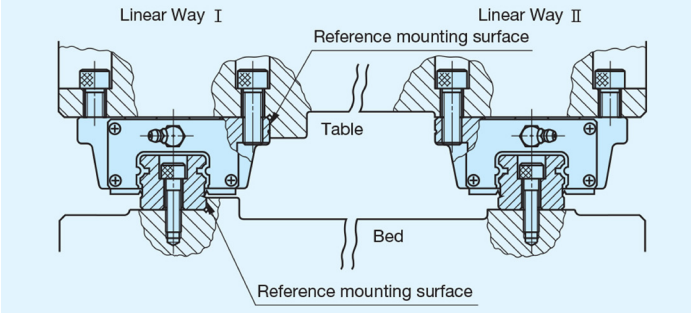
Mounting example with pressure screw.

Example 2d

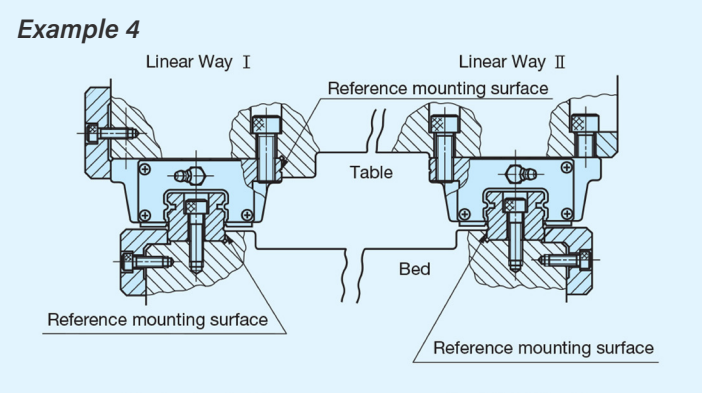


Mounting example with dowel pin.

Example 3



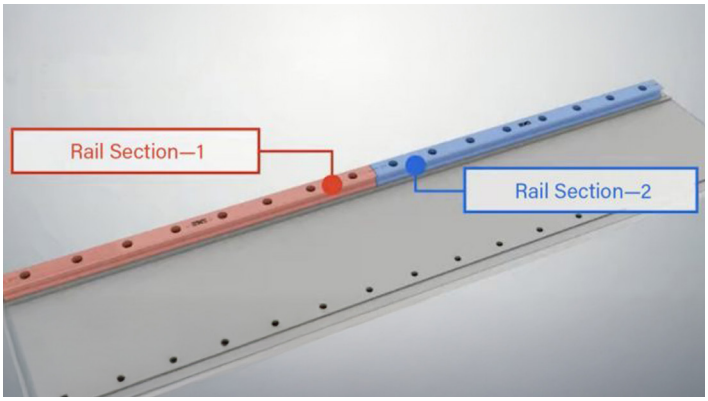
Mounting for a typical operation.



Operation for linear motion with accuracy and rigidity.

How Can Your Motion Component Manufacturer Assist With Parallel Rail Installation?

In addition to providing detailed mounting instructions and recommended specs pertaining to flatness, parallelism, torque and more, an ideal motion component manufacturer can also assist customers in meeting their unique requirements. At IKO, our engineering support team provides assistance through popular online conferencing platforms. Thanks to their widespread local presence across the country, they can also offer in-person support when special circumstances require it.



Butt-joined rails can meet long travel requirements.

We also guide customers on properly mounting their rails, taking into account the rail size and chosen carriage style — whether block type, flange type, top-mount or bottom-mount. These components are not one-size-fits-all, but they can be modified to make assembly and installation easier. In some cases, customers prefer to use the same part number for convenience, so we guide them step-by-step through the selection and installation processes, especially for more complex jobs. And if they want an extra-long piece, we can assist with butt-joining rails to meet the desired travel requirement.

Install a Successful Linear System

With an understanding of proper parallel rail installation methods and best practices, you'll achieve an optimally performing system that will reliably meet your application needs for years to come. For assistance with your parallel rail installation, IKO's engineering staff can help you get up and running while ensuring your assembly performs as intended.

For more information, please visit our website at [www.ikont.com.](http://www.ikont.com)

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