

Q&A Session for Linear Bearings and Guides 101 : Basics for Design Engineers

Q: Are there different types of "cages"?

A: The Precision A-Bearings, Instrument Bearings and RoundWays utilize metal construction or components for guidance and control of the rolling elements. Most other linear bearings typically utilize polymers to control or guide the rolling elements.

Q: According to your specifications, the maximum speed of a profile rail is 5m/s which translates to 11.18 mph. I have a requirement for a speed 4 times that amount (45mph). Is that a possibility?

A: A Roundway is capable of speeds up to approximately 70 mph and very high accelerations.

Q: Can any of your products or materials been used in service in a dry hydrogen environment? Hydrogen is less forgiving because it prevents formation of an oxide layer on metals. Perhaps flouropolymers would perform best?

A: The FNYB could be considered for such an environment. The Fluoropolymer liner has self-lubricating characteristics. However, if low friction or drag is required, a specialty bearing made with ceramic elements would also be a good consideration.

Q: I am currently using 2 round rail precision bearings mounted on steel 1" plates in alum housings. I want to upgrade to 4 bearings (supersmart). Is it better to order with pillow blocks or can a make my own out of aluminum to mount onto the steel plates? The application for my question is a weight stack top plate on exercise machines in which all the bottom plates contain teflon inserts. lowest friction is my

A: Super Smart bearings are often found in exercise equipment because of their low friction characteristics. Ordering the bearings pre-installed in an aluminum pillow block simplifies your design and minimizes cost, but sometimes the industry standard pillow block will not meet your envelope/space and mounting style requirements. If this is the case, you may either want to make your own pillow block, or submit your design to Thomson for

Q: The roundway roller bearing meets my speed requirement. What type of rail is used? Is it equally difficult to align rail segments? I will require lengths of 100 to 500 meters. Can the rails be curved?

A: Roundway roller bearings are used with Class 'L' type Round Rail shafting. Aligning rail segments is very easy with the Roundway bearing, and it can even operate while running over small gaps between consecutive rails. However, the rails cannot be curved; your system will require separate bearings in both the X and Y planes. This could warrant further discussion with DMAC.

Q: Can profile rails be butt mounted for long applications, say greater than 6m? Can you comment on the joint?

A: Profile rails are very commonly butt jointed for long stroke applications. The outside face of each rail segment is chamfered to allow the recirculating elements to transition smoothly. Care must be taken when aligning the rails at the joint. It is common to push the rails up against a reference edge to ensure correct alignment. The reference edge could be either a machined surface or spaced dowel pins. In lieu of a reference edge, the rails should be clamped together while mounting.

Q: Is the life of the bearing guaranteed/warranted based on the calculations presented?

A: It is up to the end user to determine the suitability of a given bearing for their application. The standard bearing warranty covers general quality and workmanship for up to 12 months.

Q: Would it be realistic to mount square rail to extruded aluminum framing, due to straightness

A: This is possible if you are using 1 carriage on 1 rail. However, aluminum surfaces will often deflect to take on the rail's shape rather than visa versa, if the framing cross section is not rigid enough. In this scenario, the bearing will still function, but it likely will not have an ideal running accuracy. If your application has multiple rails, and/or multiple carriages on each rail, this is not recommended.

Q: Will the Thomson factory lubricate the bearings with the customers desired grease/oil?

A: Thomson can make modifications to any standard bearing per customer specifications, including special lubrication. Please submit your requirements to Customer Service for quoting.

Q: What could be the dust protection on the tracks of the bearings?

A: Thomson Round Rail pillow blocks come standard with external seals, or if your application does not have the envelope space, the bearings can be ordered with integral wipers. Thomson Profile Rail bearings come standard with integral seals in both the end caps as well as along the length of the bearing tracks. For additional protection, wipers and scrapers can be mounted on the outside of the end caps. For very hazardous environments, bellows can be installed. These will protect not only the bearing, but the entire rail as well.

Q: What bearing would be recommended for simultaneous linear and rotational motion?

A: Thomson CMB bearings are combination movement bearings utilizing linear Ball Bushing bearings in conjunction with radial bearings. These provide for both linear and rotational motion. The FNYB would also be capable of simultaneous movement, but would much higher frictional characteristics. Thomson ball splines also allow for linear motion under torsional loads.

Q: Are there published numbers for bearing deflection for round rail bearings for various preloads versus bearing load?

A: We do not have published numbers for Round Rail bearings, but this information is available for Profile Rails, starting on page 102 of the Thomson Profile Rail Linear Guides catalog. If your application requires heavy preloading to reduce bearing deflection, you may want to consider a Profile Rail bearing instead. Deflection will be minimized, and you can specify the exact amount of preload you require.

Q: Do any of your rails allow for some curvature? ie 10ft radius for a 1 in diam rail.

A: Camfollower type bearings are typically more suited for this type of movement, however there is also a reduction on precision and accuracy of movement.

Q: From looking over the information listed, knowing application details of speed, load, load location etc. and enviromental conditions like temp, contaminates etc., you would have the ability to create an application that would provide one or two solutions...what gives?

A: Some applications, especially those that do not have many demanding specifications, will have multiple solutions that will be approximately equivalent. But even in these situations, there will be slight differences in the total cost of ownership for each bearing. This can be very important to OEM's that are using the bearings in

Q: For rollers, there is a lot less compression in the rolling element? Do you reccomend using 2 in parrallel or is it too diffict to align?

A: Although roller based products are more rigid and have higher stiffness, the use of 2 rails is still recommended whenever possible. Installation procedures have to be good to utilize the full advantage of the product. If a single rail is used, the roll moment on a single rail would have to considered as well as the stiffness of the table top mounted to the carriage.

Q: What do you recommend for cryogenic operation?

A: For depressed temperatures conditions aside from the bearing material, thermal expansion or contraction rates must be considered to ensure proper bearing fit-up and function. The FNYB and the all steel construction bearings like the A-bearing and the RoundWay would be capable.

Q: On profile rails - is it ok to have the carriages point toward on another (rather than both upward)?

A: This is definitely acceptable, as well as having the carriages point away from each other while mounted horizontally.

Q: What is a common lead time on the smaller size (i.e. 5mm wide) rails?

A: The standard lead time for all Microguide rails is 5 days.

Q: Can you discuss lubrication?

A: For low loads or higher speed low drag applications, a basic mineral oil may be suitable. Linear Lube, which is a synthetic grease with PTFE, is good for medium load conditions and is safe to use, even with food applications. For moderately high loads, a basic Lithium based grease is usually adequate. For high loads a grease with an EP additive is recommended.

Q: Can you explain European vs. Asian Metric?

A: All Thomson Metric Round Rail bearing dimensions are available per ISO standards, also known as "European Metric". "Asian Metric" bearings have slightly different bearing ODs, lengths, and retention ring groove locations. The Super Smart Ball Bushing bearing is available per both European and Asian standards.

Q: How does the cost of the T series compare to the 500 series?

A: Typical 20% - 40% cheaper. This will vary significantly based on the rail length, and to a lesser extent, the carriage type and size.

Q: Can you install one profile rail in parallel with a round rail to ease installation?

A: This will definitely ease installation requirements, but you will obviously lose some accuracy and rigidity by introducing the Round Rail. If this is not a problem for your application, you may want to consider using Round Rails on both axes, to further ease installation, and simplify your design (fewer part numbers, mounting patterns,

Q: Do you happen to have these parts in SolidWorks Format?

A: 2D and 3D models of Thomson products are available for download in most CAD file formats at http://www.danahermotion.com/website/com/eng/support/design_tools/121824.php.

Q: Was the z-axis of the weld gantry using a single bearing?

A: The Z axis was using a single 500 Series Profile Rail Bearing. While this was possible in this example due to the light load of the welding head, it is typically not recommended unless the moment loads of your application are closely reviewed and determined to be within product specification.

Q: Would you ever need to end support an open bearing? I thought the open bearings for use with a continuously supported shaft.

A: Open type bearings are only required for continuously supported rails. There is no advantage to using them on end supported shafting unless there is some application that requires access to the open area perhaps with an intermittent support for minimizing shaft deflection at certain locations or to gain some vertical clearance from the

Q: With the Fluronyliner do you need to use wipers and sealers (in harsh environments)?

A: Because the bearing is in plain contact with the shaft, it is not sensitive to contamination like recirculating element bearings, where the bearing can become jammed with contaminants. The Fluoronyliner will simply push away most contaminants. However, the contaminants can lead to increased wear of the bearing liner. Because of this, seals can be employed and be beneficial, but are typically not critical.

Q: For corrosion, is hastelloy an option?

A: For corrosion resistance, Thomson Round Rail bearings typically use a combination of 440C stainless steel and Armoloy plated carbon steel bearing elements. Specialty metals such as Hastelloy are typically not available, but special coatings and plating are available upon request.

Q: What do you use for lubrication for cryogenic temperatures? Standard lubes will freeze solid.

A: There are a number of synthetic lubricants that are designed to be used for cryogenic environments. A host of lubrication companies have lubricant offerings for use in such environments which include but are not limited to (PFPE) perfluorinated polyethers.