FAQs

Q: What is a ball screw?

A: A ball screw is a mechanical assembly consisting of a ball nut and a threaded shaft, which is used to translate rotary motion into linear motion.

Q: How energy efficient are ball screws?

A: Ball screws are highly energy efficient. Systems utilizing ball screws can achieve linear motion with average efficiencies of 90%, far exceeding the capabilities of linear actuators or screw jacks (typically 40% and 25%, respectively). Additionally, as no energy is being consumed while ball screw systems are at rest, unlike pneumatic and hydraulic systems which require constant pressurization.

Q: What is the expected lifetime of a ball screw?

A: Ball screw life expectancy varies depending on the load, rated load, shock load, speed, and other factors. If a target lifetime is specified, customizations and adjustments can be made to the features and sizing of the ball screw in order to achieve that goal.

Q: What is the difference between a ball screw and a lead screw?

A: The most significant difference between ball screws and lead screws is the way in which each device carries its load. Ball screws utilize recirculating ball bearings to minimize friction while simultaneously maximizing efficiency. Lead screws, however, depend on low coefficients of friction between sliding surfaces, leaving them far less efficient and accurate than their ball screw counterparts.

Q: What are linear guides?

A: Linear guides are mechanical devices which allow for single-dimension motion, allowing them to accurately position objects along a single axis. Linear bearings, or "blocks," slide quickly and smoothly along the linear rail with minimal friction.

Q: What data is required to spec out linear guides?

A: To determine the linear guide(s) best suited to your application, you will need to determine the following :

Rails: length, width, and load

Blocks: type, length, end-seal type, and preload accuracy

Q: How does friction affect linear guide performance?

A: Power consumption, operating temperature, and overall efficiency of a linear guide system will all be affected by two types of friction: static and dynamic. The frictional resistance of a linear guide changes depending on the type, load, speed, lubricant used, etc. The primary reason linear guides are lubricated is to avoid metal-on-metal contact and thereby to reduce friction.

Q: What is the purpose of preload in linear guides?

A: The primary purpose of preload in linear guides is to reduce elastic deformation caused by the weight of the load. This, in turn, increases the rigidity of linear guides by applying stress in advance to the contact area between the railways and rolling elements. While some linear guide applications will not require a preload, it is generally preferred regardless because it also eliminates internal clearance (zero backlash) and increases rigidity. Typical preload options include standard, light, or heavy preload.

Q: What is a lead screw?

A: A lead screw is a mechanism consisting of a threaded screw and a mated nut which uses the helical configuration of the threads to actuate linear motion. Lead screw efficiency depends heavily upon the helix angle of the screw thread. For example, a common lead screw, known as the Acme screw, has a 29° thread angle and a thread height which is equal to half of the pitch (pitch being the distance from a specified point on one thread to a corresponding point on the next parallel thread).

Q: How can a lead screw be protected from debris?

A: If your application involves a dusty or debris-filled environment, you may consider enclosing your lead screw assembly within an extruded aluminum casing or similar apparatus. Additional options include seals, wipers, and the like.

Q: How can I reduce backlash?

A: Consider a preloaded, anti-backlash nut for your assembly. Nuts can be manufactured to incorporate preload and reduce axial free play.