

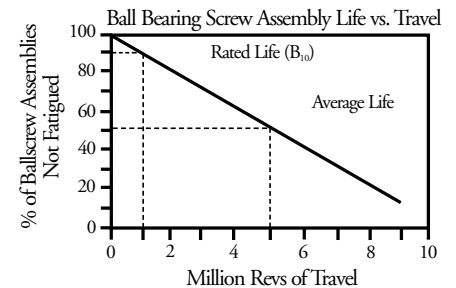
TROUBLESHOOTING

MOST FREQUENTLY ASKED QUESTIONS ABOUT BALL BEARING SCREWS

How do you calculate application life requirement in inches?

Each ball bearing screw application will have an expected life requirement given the stroke length, duty cycle, years of expected life and load.

- Life expectancy is the total inches or revolutions of travel (under load) that an assembly will provide under a stated load. (Life is sensitive to load.)
- To determine the inches of life: multiply inches of stroke x two (only on vertical applications) x cycles per hour x hours of operation per day x number of working days per year x years of expected service.



Is lubrication necessary?

Proper and frequent lubrication must be provided for satisfactory service and life. A 90% reduction in ball bearing screw life should be allowed where dry operation is unavoidable. Lubricants reduce abrasive wear and dissipate heat caused by metal-to-metal contact between bearing surfaces. Generally spindle oil or 10 weight oil may be used for most applications. Applications with infrequent duty cycles may be lubricated for extended periods with grease as long as speeds remain at 500 RPM or less as a general rule.

How are ball bearing screws synchronized?

Screw synchronizing is achieved by selecting screws with similar lead error and driven by a positive single source drive. "Matched sets required" should be specified when ordering screws that should be timed to run together without binding because of lead mismatch.

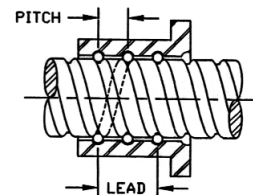
What can be done to exceed calculated critical speed?

Critical speed is a function of unsupported screw length, mean diameter of screw and bearing supports. Rigid/rigid screw mounting is the optimum support for high speeds. Consider a faster lead to reduce the RPM required. If higher speed is still necessary, go to a larger diameter screw.



What is the difference between pitch and lead?

Pitch is the measurable distance between screw grooves. Lead is the linear travel the nut makes per screw revolution. The pitch and lead are equal with single start screws. The pitch is 1/2 the lead in two start screws, etc.



What controls the backlash of single nuts?

The backlash range in a single nut is dependent on ball diameter and ball groove geometry.

Can backlash be minimized?

Yes, backlash can be minimized by use of an ogival ball groove form and eliminated completely by using a preloaded ball bearing screw.

How do you size a ball bearing screw?

Select the screw that will satisfy the most critical requirement of the application, such as high RPM, heavy load, duty cycle, column loading or low backlash.

Design for the worst case.

How should ball bearing screws be protected from dirt and contaminants?

Wipers help prohibit contaminants from entering the nut as it translates along the screw. For heavily contaminated environments, shields, bellow type enclosures or extensions are recommended to be used with wipers.

What causes premature failure?

Premature failure may be caused by any of the following:

- (a) Misalignment of ball nut to screw which results in side loading or eccentric loading will reduce life. It may cause the bearing balls to split or get flats on them. The bearings may even break out of the tubes.
- (b) Contamination inside the ball nut will not allow the bearings free circulation. The bearing balls may have flats on them because of skidding and spalling.
- (c) Lack of lubrication. Proper lubrication will help dissipate heat and reduce metal-to-metal wear on components.
- (d) High-speed operation or shaft speed resulting in screw surface speeds above 8,000 IPM will reduce rated life.
- (e) Overload conditions shall cause premature surface fatigue.
- (f) Erosion/corrosion shall lead to hydrogen embrittlement from which cracks creep to cause material failure.

What is the normal operating temperature range for ball bearing screws?

The normal operating temperature range is -65°F to $+250^{\circ}\text{F}$ with suitable lubrication. Higher temperatures may be obtained with proper higher temperature lubricants.

