Q&A from Sizing and Selection of Ball and Lead Screws

Q: Is there one fixity that is better than the others?
A: There are a number of trade offs when it comes to selecting end supports. A true fixed support will provide the greatest system stiffness but comes at a higher cost. The most common end support on the market contains a back-to-back angular contact bearing pair and this arrangement is satisfactory for the majority of applications. The combinations in order of stiffness (provide higher load capacity and higher critical speed) are fixed-free, simple-simple, fixed-simple, and fixed-fixed.

Q: Is the minimum selection shown with no safety factor?
A: The minimum selection is the lowest calculated safety factor in regards to life, speed, and load. There is a .8 safety factor used to calculate these factors.

Q: What determines whether to use a Lead Screw or a Ball Screw?
A: The application parameters will typically define the selection of the product. Lead screws typically have the following characteristics: lower load capacity, highly configurable, low maintenance, clean operation, quiet, smooth, and compact. Ball screws typically have the following characteristics: high load capacity, require periodic maintenance, increased stiffness, high efficiency, and predictable life.

Q: Please explain or give a better example of Life in Inches...?
A: The program requires that the life is input in linear travel (inches or mm). Therefore, if application life is given in time or revolutions, it must be converted based on the move profile and operation of the system. Example calculation: 8hr/day * 5 days/wk * 50 weeks/year * 2 years of expected life * 10 cycles / hr * 24 inches / cycle = 960,000 inches

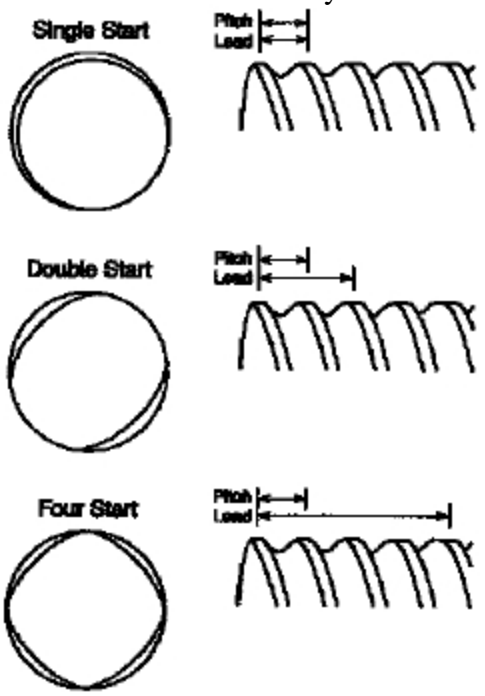
---

Q: Would a Lead Screw or Ball Screw be a better selection if you only need to move back and forth a real short distance... and inch or so...???
A: Assuming everything else being equal, I would prefer a lead screw for this application due to the lack of complete recirculation of ball bearings in a ball screw.

Q: Are there 3D drawings available for Solidworks?
A: The 3D models are available in many formats including Solidworks.

Q: Do PTFFE coated lead screws require lubrication?
A: A lead screw that is coated with a PTFE can be operated without additional lubrication but Thomson would recommend that lubrication is used in all applications.

Q: Can you explain the number of starts on screw 1, 2 and 4 and travel differences?
A: Screw starts is the integral number of independent threads on the screw shaft. The number of starts does not affect the travel distance as the lead defines the axial distance traveled during a revolution. Therefore, a screw with a lead of 10mm and 4 starts would travel the same distance as a similar screw with only 2 starts.



Q: Is there a ball screw substitute for every lead screw so an existing lead screw can be swapped out for a ball screw?
A: Even though Thomson has the largest product line of ball screws, lead screws have more combinations of available leads and therefore a drop in replacement may be hard to locate. It should be noted that a smaller ball screw will be capable of matching a lead screw for capacity.

Q: Are there self lubricating caps like used in Thomson linear rails available for lead or ball screws?
A: Lead nuts are currently made using self lubricating plastics and therefore do not need additional lubrication from this type of product. Although not standard, Thomson has supplied ball nuts with the Lube-4-Life technology as offered on the profile and linear rail products.

Q: In a washdown application, is water considered a lubricant for a lead screw with a plastic nut?

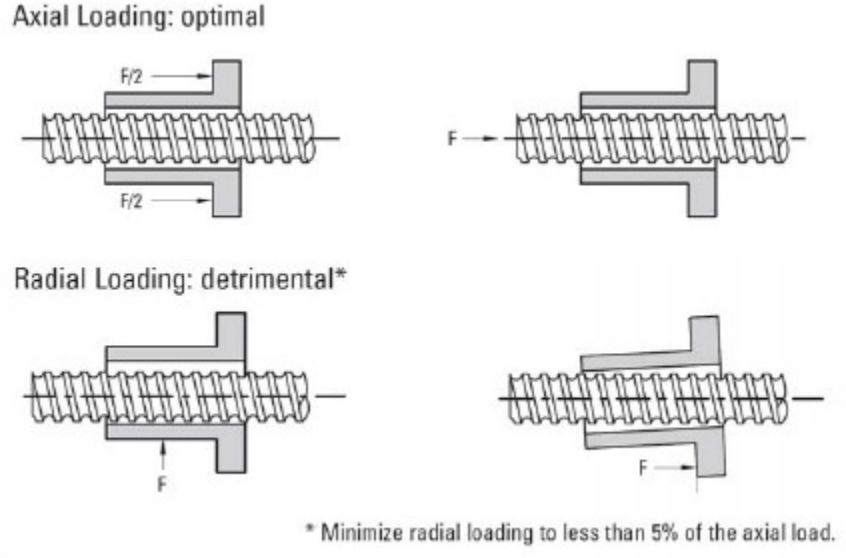
A: No, water is not a lubricant in this type of application. Typical washdown solutions are also caustic or contain other chemicals that may be detrimental to the materials used in a lead screw.

Q: Would a Lead Screw or Ball Screw be a better selection if you only need to move back and forth a real short distance... and inch or so...??? Then how many cycles until I would have to run it a long distance?
A: Assuming everything else being equal, I would prefer a lead screw for this application due to the lack of complete recirculation of ball bearings in a ball screw. If a ball screw must be used, please contact an application engineer to review the parameters to assist in life calculations.

Q: What was the phone number for technical support (ball screws)?
A: Please contact Thomson Customer Support at 540-633-3549 for assistance.

Q: I have a critical precision application. Want to achieve 100nm minimum incremental move on vertical stage. Need values for axial stiffness of ball-nut and thrust bearing at driven end of screw.
A: Please contact a Thomson application engineer to review the requirements of this application to properly size a screw assembly.

Q: What's the difference between the axial and radial load?
A: An axial load is defined as a load applied along the axis of the screw. A radial load is defined as a load applied perpendicular to the axis of the screw. See below:



Q: Does it matter if you turn the screw vs. turning the nut?

A: If done correctly, either approach is acceptable. A nut driven system is typically used on a long slender screw to eliminate vibration harmonics from developing (critical screw speed) but care must be taken to not induce a side or moment load on the nut.

Q: Thomson will have product line of High end to be compatible with THK or NSK which application for semiconductor are precious tool?
A: Thomson does have a line of precision ground / whirled ball screws that are currently in use in those applications.

Q: The design application Center will has answer with lead time ?
A: Please contact a Thomson Customer Support representative to get current lead times for products.

Q: Can you talk about load lock springs and how/when they are used?
A: A load lock spring is a secondary load path used in ball screws for vertical applications. If a failure of the ball nut occurs and all of the ball bearings are lost, then the load lock feature supports the load and doesn't allow the load to free fall.

Q: How is lead of a ball screw related to back drive?
A: Helix angles below 4° (per the following equation) will not back drive.

$$| = aheli \left(\frac{le}{d\pi} \right)$$

Q: How do you get the COF for the rail or shaft bearing? Just put in size?
A: The instructions on the input page of the Design Wizard have common values for rails and shafting and can be used to approximate the coefficient of friction (COF). For actual values, please contact an application engineer for the product used in the application.