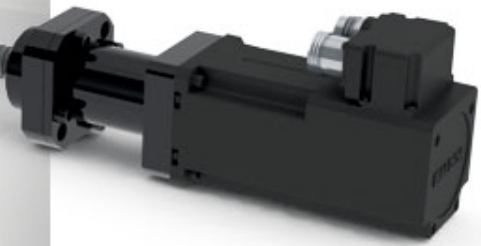




# The Engineer's Guide: Lead Screws vs. Ball Screws



# It's All About the Application

Each type of actuator has its advantages and disadvantages. Before you can decide on whether to use a ball screw or a precision lead screw, you will need to understand how the distinct characteristics of each match your specific application. In most cases, evaluating the load, accuracy and lead for your application will most generally answer the question of whether to use a ball screw or a lead screw.

A new generation of precision lead screws—such as those offered by HELIX™ Linear Technologies—significantly increases lead screw accuracy. Using advanced thread-rolling processes and material composition technologies, HELIX offers precision engineered screws that are just as accurate and repeatable as ball screws.

# Motion-Driven Automation Environments

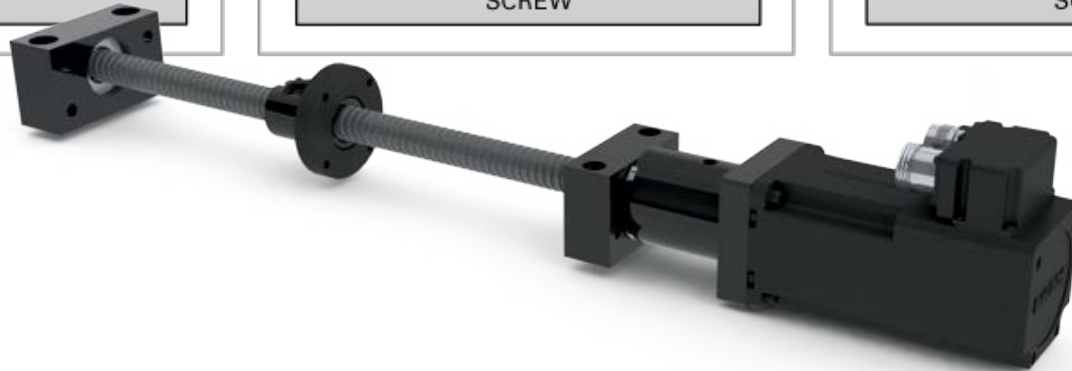
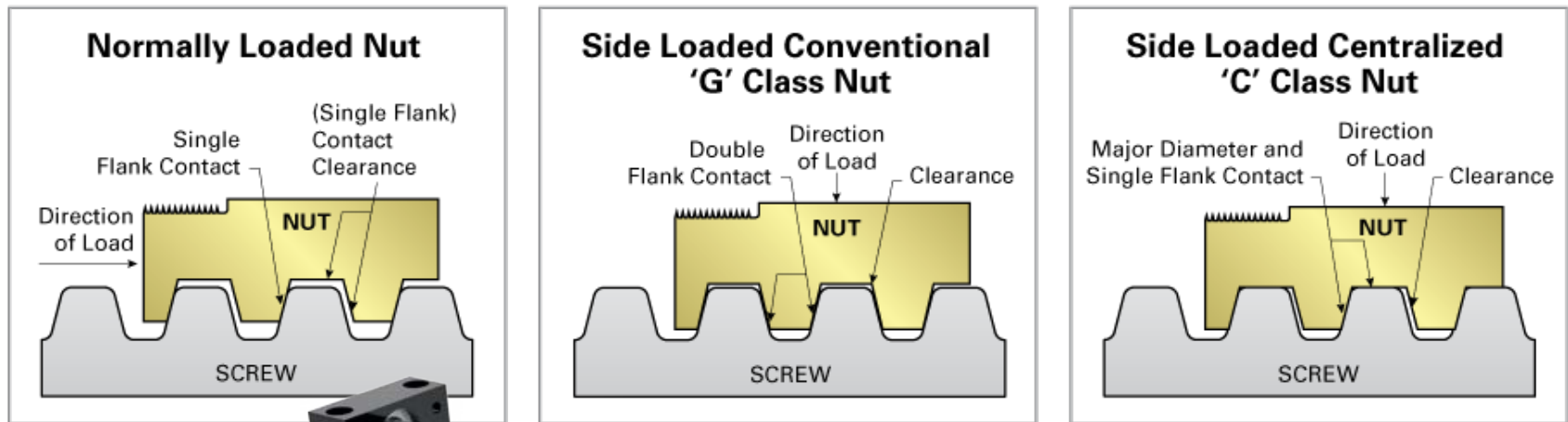
Today's motion-driven automation environments demand effective linear motion control systems, such as lead screws and ball screws. Although lead screws are often seen as less expensive substitutes for ball screws, making a decision on which type of screw to use is a lot more complicated than focusing solely on cost.

The basic difference between lead screws and ball screws is that a ball screw uses ball bearings to help minimize the friction between the nut and the screw and lead screws do not.



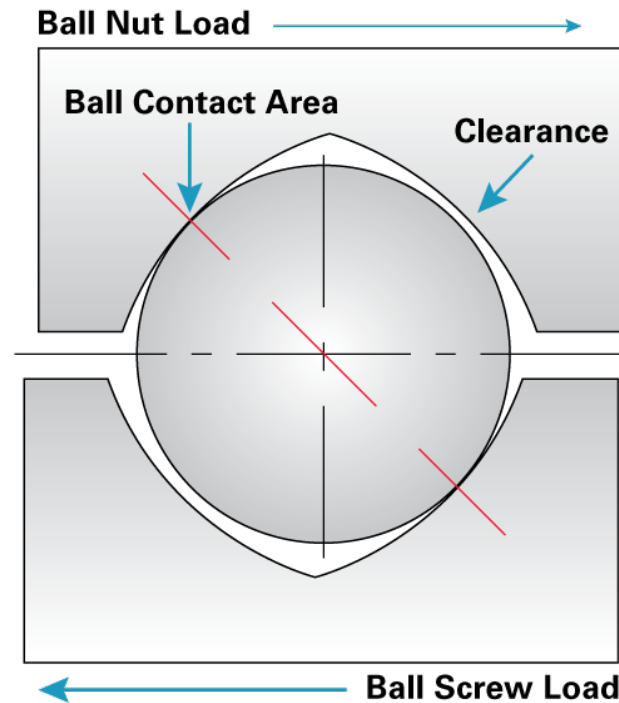
# Lead Screw Overview

Lead screws use deeper helical threads and a mating nut, which is usually made of a polymer composite or bronze.



# Ball Screw Overview

The screw and nut on a ball screw have matching helical grooves that allow the ball bearings to re-circulate in those races, and they are typically semi-circular in shape to accept the spherical ball bearing.



# Lead Screw Advantages

- Cost less
- Self-locking and do not require a braking system
- Better solution for vertical applications
- Some lead screws do not require lubrication
- More suitable for simple transfer applications requiring:
  - Speed
  - Accuracy
  - Precision
  - Rigidity



# Lead Screw Disadvantages

- Generally less efficient, requiring greater torque and may require a larger motor and drive
- Have greater friction and may operate at higher temperatures
- Most lead screws are not well suited to combined high throughput and high speed applications or those with continuous or very long cycle times
- Need to be replaced more frequently than ball screws

# Ball Screw Advantages

- More efficient, requiring less torque
- Lower friction resulting in run cooler operating temperatures
- Need to be replaced less frequently than lead screws
- Ball screws are well-suited to high-throughput, high-speed applications or those with continuous or long cycle times





# Ball Screw Disadvantages

- Considerably more expensive than most lead screws
- Require additional braking mechanisms to eliminate backdriving and ensure safe operation
- Create significant noise during operation
- Require grease or oil lubrication to achieve design life

# Quality Next-Generation Lead Screws

To help you evaluate whether to use a lead screw or ball screw for your linear motion application, contact Helix toll-free at **855-435-4958** or visit us online at [www.helixlinear.com](http://www.helixlinear.com). We manufacture the broadest product line of lead screws in the world.

To learn more about HELIX precision lead screw products, download our catalog.



We hope you found this presentation helpful in selecting the most appropriate linear motion system for your application.

For more information, please contact us at:

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