



## Technology Comparison

### Thomson Ball and Lead Screws Are Your Best Choice for Linear Motion

Thomson’s comprehensive range of ball and lead screws outperform other linear motion methods and allows you to find the optimal solution for your positioning needs.

Compared to bulky, noisy and expensive hydraulic or pneumatic systems, Thomson ball and lead screws are compact, quiet and affordable. In addition, there’s no need for pumps, hoses, fluids or shop air. This eliminates fire, safety and health hazards due to leaking fluid or other contaminants typically associated with these types of solutions.

Belt, cable and chain-drive mechanisms are relatively inexpensive. However, they aren’t as precise, repeatable or as safe to use as ball and lead screws. Their failure mode is either excessive wear or stretching, resulting in positioning inaccuracies during operation. These types of systems also have low load capacities.

Rack and pinion gear systems can be made to close tolerances but lose precision as they wear and don’t function as smoothly as ball and lead screws, even when new. Because the force is supported by a few pinion teeth at any given time, the system also is limited in terms of load capacity.

Offset cam rollers rely on the tractive force between the rollers and the shaft to create linear motion, and therefore can handle only moderate loads. The higher the load, the more likely it is that the system will slip, reducing repeatability. In summary, when compared to other types of linear motion solutions, Thomson ball and lead screws provide the superior combination of speed, accuracy, efficiency, repeatability, quiet operation, lubrication retention, load capacity and compactness.

Thomson ball and lead screws excel in applications which require the “just-right” solution. They are easily customized to provide compact, quiet and accurate positioning in light-to-medium load applications. Materials are inert as a standard and allow use in applications ranging from clean rooms to marine. Best of all, the value is high as you don’t pay for processes and features not required in your application.

The table below illustrates how Thomson ball and lead screws stacks up against other linear motion positioning solutions. On the next page, you can see a more detailed comparison between Thomson ball and lead screws to help you choose between the two. You can also contact Thomson customer support to let our application engineers help you select the optimal screw for your application.

### Thomson Ball and Lead Screws vs. Other Linear Motion Positioning Solutions

|                         | Thomson Ball & Lead Screws (ball / lead) | Fluid Power | Belt, Cable, and Chain-Drive Mechanisms | Rack & Pinion | Offset Cam Rollers | Pneumatic Cylinders |
|-------------------------|--|-------------|---|---------------|--------------------|---------------------|
| Inexpensive             | ● / ●                                    | ○           | ●                                       |               | ●                  |                     |
| Low Power Consumption   | ● /                                      |             | ●                                       | ●             | ●                  |                     |
| Low Maintenance         | ● / ●                                    |             | ○                                       | ○             | ○                  | ●                   |
| High Accuracy           | ● /                                      |             |   |               |                    |                     |
| High Repeatability      | ● / ○                                    |             |   |               |                    |                     |
| High Efficiency         | ● /                                      |             |   | ○             | ○                  |                     |
| High Load Capacity      | ● /                                      | ●           |   |               |                    | ○                   |
| Compact Size            | ● / ●                                    |             |   | ●             |                    | ○                   |
| Speed                   | ● / ●                                    |             | ●                                       | ●             |                    | ●                   |
| Low Noise               | ● / ○                                    |             | ○                                       |               | ○                  |                     |
| Design Flexibility      | ● / ●                                    |             |   | ○             |                    |                     |
| Contamination Tolerance | ● / ○                                    | ●           |   |               |                    |                     |

● = always  
○ = in most cases

## Technology Comparison

### Design Considerations for Choosing Between Ball and Lead Screws

| Design Considerations | Thomson Ball Screw  | Thomson Lead Screw   |
|-----------------------|---|--|
| Load                  | Usually heavy (>100 lbs.)   | Typically light (<100 lbs.)  |
| Cost                  | Higher cost \$\$\$  | Low cost \$\$  |
| Anti-backlash         | Available   | Available — but has low stiffness  |
| Self-locking          | No  | Yes — but depends on lead and lubrication  |
| Efficiency            | Generally ranges from 85% to 95%  | Generally ranges from 30% to 70%   |
| Duty Cycle            | Unlimited   | Typically 50%  |
| Corrosion Resistance  | Stainless steel, coating and plating options available depending on size and type | Available in stainless steel with polymer nuts as a standard                         |
| Lubrication           | Must have lubrication<br>Wide range of lubricants                                 | Can operate with or without lubrication depending on application                     |
| Operating Temperature | Wide temperature range  | Limited to expansion differences between the screw and the nut                       |
| Preload               | Available   | Not available  |
| Travel Speed          | Max. 165 in/s (4.2 m/s) for a 20 x 50 screw                                       | Max. 65 in/s (1.6 m/s) for a 20 x 50 screw   |
| Vibration and Noise   | Ball re-circulation   | Typically quiet,<br>high leads are best  |
| Custom Availability   | Great flexibility in customizing<br>Screw end machining                           | Flexibility in customizing nut materials and geometry along with screw end machining |



## Product Overview

### THOMSON BALL SCREWS — INCH SERIES

**The most comprehensive imperial-based ball screw product offering in the industry.**

Thomson is the market leader in inch-dimensioned ball screws, featuring a comprehensive product offering. Our Precision Rolled Ball Screws come in a full range of diameters, leads, and ball nut configurations, in either preloaded or non-preloaded types, all in industry-standard envelopes. They provide dependable accuracy and repeatability at an economical price. All Thomson ball screws feature a Gothic arch ball groove geometry that extends service life, reduces lash, and optimizes stiffness in preloaded assemblies. This unique design feature also eliminates skidding, increases positioning accuracy, and maximizes travel life.



### THOMSON BALL SCREWS — METRIC SERIES

**Superior performance for today's most stringent positioning requirements.**

Thomson offers a full range of internal return metric ball screw products, featuring two distinct product families. Miniature Metric Rolled Ball Screw assemblies are an efficient, cost-effective solution in a small envelope. Miniature metric ball screw assemblies range from 4 to 14 mm in diameter, with standard lead accuracies of 52 microns/300 mm. Thomson Metric Rolled Ball Screw assemblies are designed and manufactured to provide high level performance at an affordable price. Ball screws are manufactured using Thomson's patented, German-engineered Precision Screw Forming (PSF) Technology, which provides high accuracy (23 microns/300 mm standard) with the manufacturing efficiency of rolled processes. Thomson Metric Rolled Ball Screw assemblies are available in a wide range of diameters, leads and nut styles — all designed to provide quiet, smooth running, efficient performance. Ball nuts include one of three unique ball return systems providing perfect guidance, low wear, and smooth running performance.



### THOMSON PRECISION BALL SPLINES

**High reliability, speed, and versatility for tough applications with torque loads.**

Thomson precision ball splines provide high speed, anti-friction linear motion under high torsional loads. They have high reliability under varying operating conditions and predictable life expectancy. They resist radial displacement resulting from torque loads, and require smaller forces to achieve axial displacement of the spline member while transmitting torque. Ball splines have application versatility such as helicopter rotor couplings; translating drive shaft couplings, non-swiveling telescoping struts; honing machine and drill press spindles, workhead and table ways, and remote and robot handling machines.



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Offset cam rollers rely on the tractive force between the rollers and the shaft to create linear motion, and therefore can handle only moderate loads. The higher the load, the more likely it is that the system will slip, reducing repeatability. In summary, when compared to other types of linear motion solutions, Thomson lead and ball screws provide the superior combination of speed, accuracy, efficiency, repeatability, quiet operation, lubrication retention, load capacity and compactness.

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| Low Power Consumption   | / ●                                      |             | ●                                      | ●             | ●                  |                     |
| Low Maintenance         | ● / ●                                    |             | ○                                      | ○             | ○                  | ●                   |
| High Accuracy           | / ●                                      |             |  |               |                    |                     |
| High Repeatability      | ○ / ●                                    |             |  |               |                    |                     |
| High Efficiency         | / ●                                      |             |  | ○             | ○                  |                     |
| High Load Capacity      | / ●                                      | ●           |  |               |                    | ○                   |
| Compact Size            | ● / ●                                    |             |  | ●             |                    | ○                   |
| Speed                   | ● / ●                                    |             | ●                                      | ●             |                    | ●                   |
| Low Noise               | ● / ○                                    |             | ○                                      |               | ○                  |                     |
| Design Flexibility      | ● / ●                                    |             |  | ○             |                    |                     |
| Contamination Tolerance | ● / ○                                    | ●           |  |               |                    |                     |

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## Technology Comparison

### Design Considerations for Choosing Between Lead and Ball Screws

| Design Considerations | Thomson Lead Screws  | Thomson Ball Screws  |
|-----------------------|--|--|
| Load                  | Typically light (<100 lbs.)                                      | Usually heavy (>100 lbs.)  |
| Cost                  | Low cost \$\$  | Higher cost \$\$\$   |
| Anti-backlash         | Available — but has low stiffness                                | Available  |
| Self-locking          | Yes — but depends on lead and lubrication                        | Fail safe brake locking option   |
| Efficiency            | Generally ranges from 30 to 70%                                  | Generally ranges from 85 to 95%  |
| Duty Cycle            | Limited to plastic heat transfer properties                      | Unlimited  |
| Corrosion Resistance  | Available in stainless steel as a standard                       | Wide range of available sizes in stainless steel, as well as coating and plating options |
| Lubrication           | Can operate with or without lubrication depending on application | Must have lubrication<br>Wide range of lubricants  |
| Operating Temperature | Limited to expansion differences between the screw and the nut   | Wide temperature range   |
| Travel Speed          | Available in wide range of leads                                 | Typically mid-range leads  |
| Vibration and Noise   | Typically quiet, high leads are best                             | Ball re-circulation  |
| Custom Availability   | Great flexibility in customizing materials and geometry          | Great flexibility in customizing materials and geometry — limited by ball path envelope  |
| Catalog Page          | 7  | See separate catalog   |

## Product Overview

### Lead Screws

Thomson precision lead screws are an excellent economical solution for your linear motion requirements. For more than 30 years, Thomson has designed and manufactured the highest-quality lead screw assemblies in the industry. Our precision rolling machines ensure accurate positioning to 0.003 in/ft, and our PTFE coating process produces assemblies that have less drag torque and last longer.

Thomson provides a large array of standard plastic nut assemblies in anti-backlash or standard Supernut® designs. All of our standard plastic nut assemblies use an internally lubricated Acetal, providing excellent lubricity and wear resistance with or without additional lubrication. With our unique zero-backlash designs, Thomson provides assemblies with high axial stiffness and the absolute minimum drag torque to reduce motor requirements. These designs produce products that cost less, perform better and last longer. Both designs automatically adjust for wear, ensuring zero backlash for the life of the nut.

For significantly higher loads, standard bronze nuts are available. Thomson uses SAE 660 bearing bronze, which provides high load capacity with good PV performance. We also offer end machining to your specification or can provide you with stock bearing mounts or motor mounts. Thomson bronze nuts are available from more than 1800 distributors worldwide.

Thomson also provides engineering design services to aid in your design requirements and produces lead screw assemblies to your specifications. Contact customer support for more information.





## Product Overview

### Lead Screw Product Summary

| Series           | Thomson Precision Lead Screw                        |  |
|------------------|---|--|
|                  | Inch  | Metric   |
| Lead accuracy    | 0.010"/ft. for standard<br>0.003"/ft. for precision | 250 micron/300mm for standard<br>75 micron/300mm for precision |
| Diameter         | 0.187" - 1.500"                                     | 6 - 24 mm  |
| Lead             | 0.013" - 2.00"                                      | 0.5 - 50.0 mm  |
| Backlash         | 0.010" (max)  | 0.25 mm (max)  |
| Dynamic Load     | Up to 400 lbs*                                      | Up to 1.3 kN*  |
| Max. Static Load | Up to 2,000 lbs*                                    | Up to 6.6 kN*  |
| Catalog Pages    | 11 - 39   | 11 - 39  |

\* Plastic nut ratings. Does not include bronze nut specifications.

### Lead Screw Product Availability

|            | Inch  | Lead (in.) |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|------------|-------|------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|            |       | 0.031      | 0.050 | 0.063 | 0.083 | 0.100 | 0.125 | 0.167 | 0.200 | 0.250 | 0.300 | 0.375 | 0.400 | 0.500 | 0.750 | 0.800 | 1.000 | 1.200 | 1.500 | 2.000 |
| Dia. (in.) | 3/16  |            | ●     |       |       | ●     | ●     |       | ●     |       |       | ●     | ●     | ●     |       |       |       |       |       |       |
|            | 1/4   | ●          | ●     | ●     |       |       | ●     |       | ●     | ●     |       |       |       | ●     | ●     |       |       |       |       |       |
|            | 5/16  |            |       |       | ●     |       |       | ●     |       | ●     |       |       |       | ●     |       |       | ●     |       |       |       |
|            | 3/8   |            | ●     | ●     | ●     | ●     | ●     | ●     | ●     | ●     | ●     |       |       | ●     | ●     |       | ●     | ●     |       |       |
|            | 7/16  |            |       |       |       |       | ●     |       |       | ●     |       |       |       | ●     |       |       |       |       |       |       |
|            | 1/2   |            |       | ●     |       | ●     |       |       | ●     | ●     |       |       |       | ●     |       | ●     | ●     |       | ●     |       |
|            | 5/8   |            |       |       |       | ●     | ●     |       | ●     | ●     |       |       |       | ●     |       |       |       |       |       |       |
|            | 3/4   |            |       |       |       | ●     | ●     | ●     | ●     | ●     |       |       |       | ●     |       |       | ●     |       | ●     | ●     |
|            | 1     |            |       |       |       | ●     | ●     |       | ●     | ●     |       |       |       | ●     |       |       | ●     |       |       |       |
|            | 1-1/4 |            |       |       |       |       |       |       | ●     | ●     |       |       |       |       |       |       |       |       |       |       |
| 1-1/2      |       |            |       |       |       |       |       | ●     | ●     |       | ●     |       | ●     |       |       |       |       |       |       |       |

|           | Metric | Lead (mm) |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |
|-----------|--------|-----------|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|
|           |        | 1         | 2 | 3 | 4 | 5 | 6 | 8 | 10 | 12 | 15 | 16 | 20 | 25 | 35 | 45 | 50 |
| Dia. (mm) | 4      | ●         |   |   | ● |   |   | ● |    |    |    |    |    |    |    |    |    |
|           | 6      | ●         | ● | ● |   |   | ● |   |    | ●  |    |    |    |    |    |    |    |
|           | 10     |           | ● | ● | ● | ● | ● |   | ●  | ●  |    |    | ●  |    |    |    |    |
|           | 12     |           |   | ● | ● | ● | ● |   | ●  |    |    | ●  |    | ●  |    | ●  |    |
|           | 16     |           |   |   | ● | ● |   | ● |    |    |    | ●  |    | ●  | ●  |    |    |
|           | 20     |           |   |   | ● |   |   | ● |    | ●  |    | ●  | ●  |    |    | ●  | ●  |
|           | 24     |           |   |   |   | ● |   |   |    |    |    |    |    |    |    |    |    |

Availability charts do not include V-thread screw leads.



## Product Overview

### Glide Screw™

What is a Glide Screw? Part linear bearing and part lead screw, it is combination of two favorites to create something better than both. The Glide Screw brings high performance, fast installation and less complexity in a small package. Inch and metric sizes are standard, and custom sizes are available quickly and to your specification.

#### Standard Sizes and Configurations Stocked

- Metric Series includes 4, 6 and 10 mm nominal diameters
- Inch Series includes 3/16", 1/4" and 3/8" nominal diameters
- Flanged and cylindrical nut bodies standard

#### Optional Configurations for Harsh Environments Available

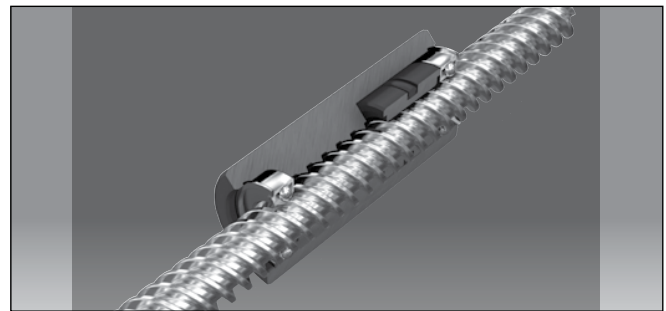
- High temperature resistant – inside ovens or autoclaves to up to 175 °C (347 °F)
- Clean room – in robot vacuum chambers, laboratories or medical equipment (ISO 6)
- Food grade – in packaging and food processing equipment

#### Easy to Install and Maintenance Free

- All required is a Glide Screw and an anti-rotation feature
- No need for reference surfaces or the pain of "floating" your system into alignment
- Plug and play means you can install it and forget it
- Integrated Thomson's Lube for Life technology
- Bearing-grade plastic and stainless steel construction standard

#### Reduced Footprint

- Integrated lead screw / linear bearing
- Side load / moment load capable



#### Improved Equipment Uptime

- Screw and linear bearing are already aligned
- Component alignment is not critical – smooth and quiet motion
- Integrated lubrication block – Thomson Lube for Life standard

#### Lower Cost of Ownership

- Less complexity – faster installation
- Less components – simpler bill of material
- Maintenance free – no lubrication required

#### Custom Nut Configurations, Screw Diameters and Thread Leads Available

- If you can't find your ideal configuration, contact us. We can customize to your specifications.

