Elegantly simple: linear motion that saves cost and space

The use of lead screws with guide rails is a proven technology for applications requiring linear motion but it is often over-engineered for smaller applications where only light duty is required. In areas such as lab automation or 3D printing, a simpler, easier-to-install alternative has a great deal of appeal to machine builders, says Tobias Münch.

With this requirement in mind, Thomson has developed a new product called 'Glide Screw', which combines both linear bearing and lead screw in a single device without the need for additional guidance components. This patent pending technology has a much smaller footprint than the traditional round or profile rail screw and guide systems. It is quicker and easier to install, removes alignment issues and is effectively maintenance-free.

Traditional linear motion systems, which use a screw and guide, do not make use of the outside diameter of the screw. In developing its alternative for smaller footprint applications, Thomson dispensed with external guides by using the outside of the screw as a bearing surface. The resulting product uses just a lead screw and lead nut to deliver linear motion for small machines.

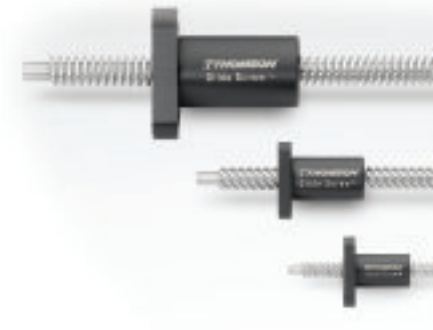
A traditional lead screw and lead nut can handle an axial load transmitted via the nut threads to contact bearings at both ends of the assembly. However, this system cannot take side or moment loads; such loading would cause all sorts of problems, including binding, squeaking, higher torque and premature failure. To resolve this, the Thomson screw has a bearing grade finish with radial bearings, which slide along the outside of the screw.

The bearing carriage is between the inside races of the radial bearings and outside diameter of the screw. To handle radial loads, opposing reactionary forces are created where the bearings touch the outside of the screw. Twisting or moment loads are also transmitted via the bearings in an opposing direction. In this way, the Glide Screw's simple lead screw and lead nut design can handle axial, radial and moment loads.

With no external guides, the Glide Screw offers a smaller footprint and fewer parts. Indeed, compared with an equivalent traditional round rail system, Glide Screw has less than 40 percent of the components. Systems that use linear guides also require precise screw alignment in relation to the guides and careful preparation of reference surfaces. Any misalignment is likely to lead to premature failure in the field. Because it combines lead screw and guide, Glide Screw is pre-aligned at the factory, reducing set-up time on installation. All that is needed, along with the Glide Screw itself, is a feature to stop rotation.

Compared with a round rail guided linear motion system, Glide Screw installation, surface preparation and alignment can typically be undertaken in a quarter of the time. And when comparisons are made with a profile rail, which demands great care and needs tight tolerances in surface preparation, the Thomson product takes even less time to install.

Thomson claims Glide Screw is effectively maintenance-free, thanks to the use of its 'Lube-4-Life' technology, which is a standard feature of the product. This self-lubricating system uses a polymer block – essentially a sponge with lubricant retained within its pores – that is located within the lead nut. As the nut moves along the screw, a small amount of lubricant is released, sufficient to maintain the system's long-term performance and reliability.



A good choice for small machines

Glide Screw is a suitable choice for laboratory instrument or medical device designs where a more compact, cleaner, smoother and quieter linear motion is desirable. It also offers the precision necessary for these applications, but in a more cost-effective way than traditional linear guided systems, which tend to be over-designed – particularly for those laboratory automation applications requiring movement in three axes. And in 3D printing machines, the device can also help reduce product complexity (and hence cost) while improving reliability.

Thomson stocks Glide Screw in a range of standard metric and imperial standard sizes with flanged and cylindrical nut bodies for fast delivery. If required, special configurations are available for use in high temperature applications (such as ovens or autoclaves), clean room environments and processes requiring food grade materials.

Depending upon machine requirements, the screws can be mounted with fixed/fixed, fixed/supported or supported/supported end supports. An efficient customisation service is also available from Thomson for custom nut configurations, screw diameters and thread leads to meet customers' own specifications.

Since Glide Screw is both drive system and linear guide, the device is supplied perfectly aligned and therefore cannot bind. It can handle axial, moment or side loads without additional linear guidance or support.

Thomson designed the Glide Screw with an understanding of the needs and demands of small machine builders. With standard and custom sizes available, this device offers an innovative alternative to complex, traditional linear motion solutions for many applications including small-scale laboratory automation, medical imaging, multi-axis printing and pick-and-place machines. Where light duty linear motion is required, it can lower the total cost of ownership of a machine and deliver overall improved performance.

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