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Bypassing complex controls results in faster, simpler, less expensive designs

Linear drive systems offering automatic reversal of the traversing nut and the ability to adjust speed independently of the drive motor almost invariably require a variety of sometimes costly components. These include electronic control systems, sensors, clutches, encoders, reversible variable-speed motors, and gearboxes. Training personnel to operate these systems further adds to the overall investment. What's more, equipment investment and maintenance is a specialized business requiring skilled technicians and labor.

Is a Traditional Solution Justified?
The popular linear motion consideration set includes traditional solutions that have been around since the industrial revolution. These include ball screws, pneumatic systems, hydraulics, timing belts, and other methods. An OEM designer can consume considerable design time configuring the controls for a routine linear motion system employing any of these technologies.

For example, a ball screw has to be stopped to reverse the traversing nut's direction. This requires the designer to incorporate a reversible motor, controls, sensors, gears, and other accessories. Additionally, the screw's threads can become clogged, causing the system to jam. Avoiding this often requires using a protective bellows assembly, which adds to design costs and limits space.

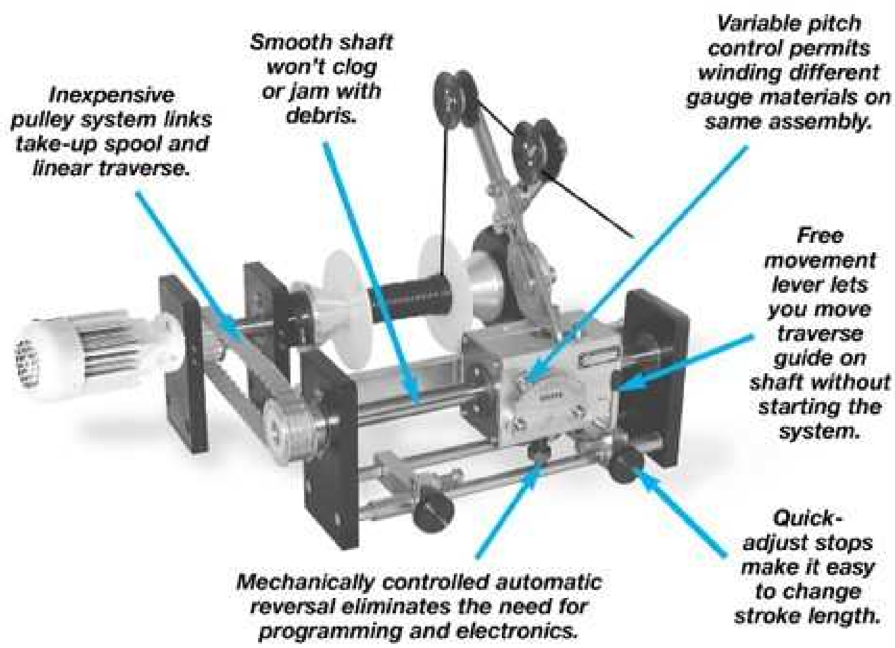
Likewise, other traditional linear motion technologies require the acceptance of "extras" that can increase costs and reduce the overall operation's productivity. Timing belts require servo/stepping motors, switches, encoders, sensors, and programmable logic controllers. Pneumatic systems pose design space limitations—twice the stroke distance is required per piston. Hydraulic systems entail complicated mechanics and electronics, as well as multispeed, direct-braked motors, pumps, and solenoids. Moreover, cleaning up after leaks can become an ongoing maintenance issue.

In short, the investment in a linear motion system can be significant. Such an investment is justified for some operations—for example, batch control processes, precision machine tool applications, and other high-accuracy procedures.

Seek Alternatives When Indicated
For the most part, linear motion professionals are used to linear motion systems, which include expensive, maintenance-intensive components such as variable-speed, direct-braked motors, valves, and solenoids, gear-head assemblies, and motion control systems. The downtime required for procedures such as changing gear heads and basic maintenance is part and parcel to the process in which the linear motion system is to be used. The time and costs are simply figured into the production plan.

However, for production processes involving repetitive, reciprocating motion procedures (e.g., spooling/winding, slitting, or spraying), the operating and maintenance costs associated with traditionally developed linear motion systems can be avoided. You can design a simpler system that meets application requirements and saves money.

One of the least likely places to begin looking for alternatives is with the linear drive nut. Yet this is where you may find your most economical and efficient alternative solution.



Example 1: Using rolling ring linear motion in level winding system.

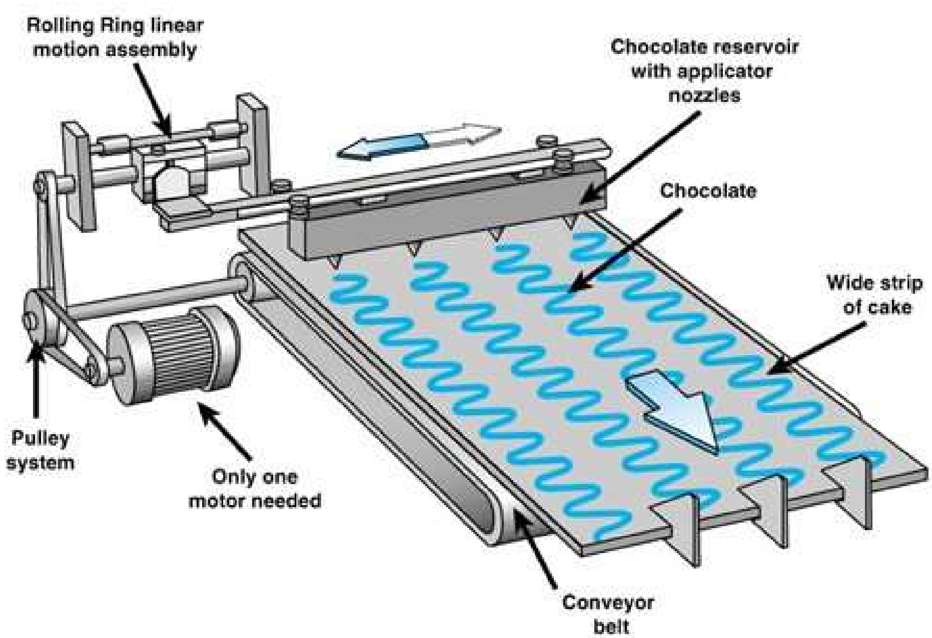
For example, "rolling-ring" linear drives operate on a mechanical principle that creates efficient reciprocating linear motion—with autoreverse and variable pitch—but doesn't depend on complex, expensive controls. This reduces design time and costs, enhancing profitability. Many reciprocating and positioning linear motion applications can benefit from rolling-ring engineering.

A Justifiable Alternative

Rolling-ring linear drives impart several basic benefits: elimination of complex, electronic controls, clutches, cams, and gears; ease of operation and maintenance; and improved productivity derived from longer periods of continued operation of production equipment.

In a rolling-ring linear drive, the rotation of a smooth, unthreaded shaft is converted into linear output. Within the drive housing, a series of rolling-ring bearings with specially contoured inner race surfaces maintains continuous contact with the drive shaft. When the shaft is rotated, and the ring assembly is angled on the shaft, the inner races bear against the shaft. This causes the assembly to essentially roll along the shaft, generating linear movement from the motor's rotary input.

Certain models of rolling-ring linear drives require only a single-speed, unidirectional motor to provide reversible linear motion with variable pitch. These motors are significantly less expensive than their reversible, direct-braked, variable-speed counterparts.



Example 2: Rolling ring linear motion used in a cake icing process simplifies linear motion design and operation.

In many instances, a rolling-ring linear drive permits both reversing direction and adjusting pitch without slowing or stopping the system. Production rates can therefore be maintained at a higher level than with a system that requires routine shutdowns for adjustments or maintenance.

Depending on the make and model, rolling-ring linear drives provide up to 800 pounds of axial thrust. In some applications, travel length may be up to 16 feet at speeds of up to 13 feet per second. Accuracy varies from within ±0.005 inches to ±0.0004 inches.

A rolling-ring linear drive's dynamic shaft/bearing interface is virtually backlash free because there are no gaps between the bearing surface and the shaft. In many instances, rolling-ring technology reduces design time because it bypasses the need for complex, costly controls.

Operating (training) and maintenance expenses are also reduced. Rolling-ring linear drives require no special training, and the only maintenance needed is periodic lubrication of the drive shaft. Furthermore, because the drive shaft has no threads, the system remains virtually clog free. The cost of fabricating a bellows assembly is eliminated. Finally, in case of overload, rolling-ring linear drives "slip" rather than jam. This protects the system from "churning" and protects valuable system components from damage.

Designing with rolling-ring linear drives reduces the time you invest. Bypassing complex controls results in faster, simpler, less expensive projects. For many linear motion applications, rolling-ring linear drives are worth a look. They may make some of your linear motion applications less costly and more efficient.

If you consider using a rolling-ring linear drive, make certain you're working with a company that has proven experience with this technology. Conversion from ball bearings to the rolling-ring variety is a precise procedure. Only experienced rolling-ring manufacturers have the machining expertise required. Additionally, the rolling-ring provider you select should provide expert design engineering assistance matched to your application requirements.