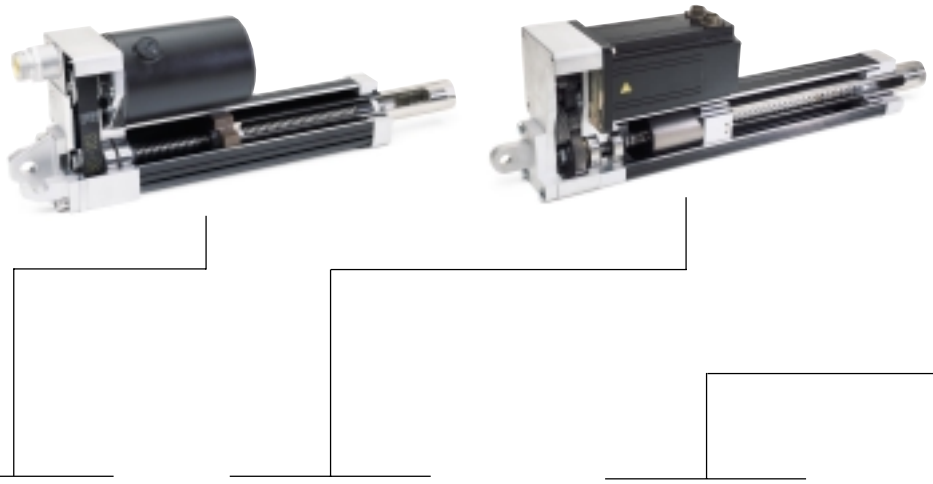
Mechanical Drive Comparison

The following chart will help pinpoint which linear drive mechanism is right for your application. IDC offers many actuator options, such as brakes, encoders, lubrication ports, preloaded nuts, and precision ground screws, that may help you meet your specification. If these standard options do not meet your requirements, please contact the factory for information regarding custom solutions.



Considerations	Acme Screw	Ballscrew	Belt Drive
Noise	Quiet	Noisy	Quiet
Back Driving	Self locking	Easily backdrives	Easily backdrives
Backlash	Increases with wear	Constant throughout screw life	Can increase with wear or stretching of belt
Repeatability	+/-0.005" to 0.0005"	+/-0.005" to 0.0005"	+/-0.004"
Duty Cycle	Moderate max. 60%	High max. 100%	High max. 100%
Mechanical Efficiency	Low Plastic Nut - 50% Bronze Nut - 40%	High - 90%	High - 90%
Life and Mechanical Wear	Shorter life due to high friction	Longer	Longer
Shock loads	Higher	Lower	Low
Smoothness	Smooth operation at lower speeds	Smooth operation at all speeds	Smooth operation at all speeds
Speeds	Low	High	Higher
Cost	$$ Lowest	$$$ Moderate	$$$ Moderate

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Linear Motor	Comments
Moderate	**Acme:** Sliding nut design provides quiet operation. **Ball:** Transmits audible noise as balls recirculate through nut during motion. **Belt:** the neoprene cover of the belt provides damping of noise. The support bearings will generate some noise.
Easily backdrives	**Acme:** Good for vertical applications; vibration may cause position loss. **Ball:** May require brake or holding device when no holding torque is applied to the screw. **Belt:** May require brake or holding device when no holding torque is applied to the drive pulley. **Linear motor:** Low friction system–backdrives easily.
Negligible	**Acme:** Considered worn-out when backlash exceeds 0.020". Typically 0.006" when shipped from the factory. **Ball:** Typically constant at 0.006" (lead screw/nut only). **Belt:** Typically at 0.010" when shipped. Can be adjusted to compensate for wear or stretching. **Linear motor:** with a preloaded rail there is zero backlash.
Best (microns)	**Linear motor:** repeatability depends upon the encoder used. Sub micron possible.
High max. 100%	**Acme:** Low duty cycle due to high friction from sliding surface design. **Ball:** High screw efficiency and low friction allow high duty cycle. **Belt:** High efficiency provides low heating and high duty cycle.
Highest - 90-95%	**Acme:** Low efficiency sliding friction surfaces. **Ball**: High efficiency smooth rolling contact. **Linear motor:** Efficient - no conversion needed between rotary and linear motion.
Longest life, least mechanical wear	**Acme:** Mechanical wear is a function of duty cycle, load and speed. **Ball:** Virtually no mechanical wear when operated within rated load specifications. **Belt:** High efficiency contributes to long life. Drive belts can be easily replaced to extend system life. **Linear motor:** Limited by cable flex, and bearing life.
Highest	**Acme:** Better suited because of larger surface area. **Ball:** Brunelling of steel balls limits shock load capability. **Belt:** Shock loads can cause fatigue and stretching of drive belts.
Smoothest	**Acme:** At extreme low speeds, units have a tendency to stop/start stutter (due to friction). **Ball:** Generally smoother than acme through the entire speed range. **Belt:** 180° engagement of belt provides continuous smooth contact throughout the speed range.
Highest	**Acme:** Extreme speeds and accelerations can generate excessive heat and deform the screw. **Belt:** Each revolution of the drive pulley provides several inches of travel. Speeds up to 120 in/sec can be achieved. **Linear motor:** LM to 196 in/sec. LD to 394 in/sec.
$$$$ Highest	