

# Motion Without Limits.



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## Linear Motion

Linear motion guides find use in a variety of precision linear motion applications, from machine tools to medical equipment. They come in two basic types: plain bearing and rolling element. Rolling-element types are further categorized as recirculating ball bearing and guide wheel.

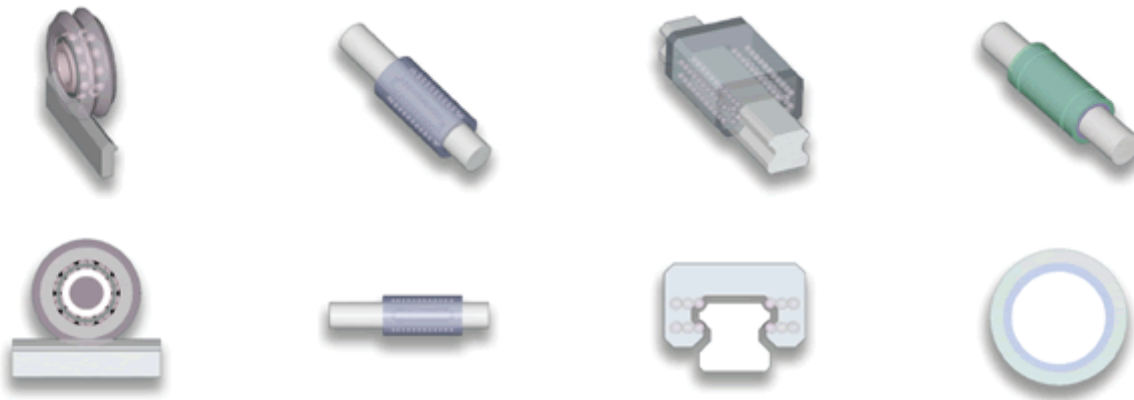
Recirculating linear motion types support loads with a continuous stream of bearing balls that move in and out of contact with a guide rail. The bearings are made to follow straight sections with radii at their ends. This causes balls to vibrate and make noise as they accelerate from the straight to curved sections. The use of polymer cages that separate balls lowers, but does not eliminate, ball-bearing noise in square-rail designs.

Guide wheels, in contrast, react loads through wheels that run on triangular-profile rails. Guide wheels can lower noise levels by 20% compared with square-rail linear motion systems, because the ball-bearing raceway path is a constant radius.

Guide wheels are also more forgiving of mounting-surface irregularities than recirculating linear motion designs. Parallel-track guide wheel systems work fine when mounted on surfaces flat to  $\pm 0.004$  in. For comparison, mounting surfaces for square rails are typically held to  $\pm 0.001$  in., which can substantially raise installation costs. Still, be sure to carefully prepare surfaces for parallel-track systems needing high accuracy and repeatability.

Off-the-shelf linear motion guide-wheel systems have a positioning accuracy of about  $\pm 0.005$  in. depending on the accuracy of the track-mounting surface. Tracks made of drawn steel that is hardened and ground can push that number down to about  $\pm 0.001$  in.

The operating environment is another important consideration with linear motion. Guide wheels better tolerate contamination than recirculating designs and don't need protective covers on track ways.



Characteristic	Guide Wheels	Round Rail	Square Rail	Teflon Bushing
Antifricition	<b>Yes</b>	Yes	Yes	No
High Speed	<b>Excellent</b>	Good	Good	Excellent
High Load	<b>Good</b>	Good	Excellent	Good
Accuracy	<b>Good</b>	Good	Excellent	Fair
High Temperature	<b>Excellent</b>	Good	Poor	Poor
Dirty Environment	<b>Excellent</b>	Poor	Poor	Good

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Clean Environment	<b>Good</b>	Good	Good	Poor
Ease of Assembly	<b>Excellent</b>	Good	Good	Good
Noise	<b>Excellent</b>	Good	Good	Excellent
Long Lengths	<b>Excellent</b>	Good	Poor	Good
Rotary Capability	<b>Yes</b>	No	No	No
Compliance	<b>Excellent</b>	Good	Poor	Fair
Rigidity	<b>Good</b>	Good	Excellent	Fair
Low Profile	<b>Excellent</b>	Poor	Excellent	Fair
Cost	<b>Excellent</b>	Good	Poor	Excellent

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