

ENGINEERING CONSIDERATIONS AND TERMINOLOGY

Travel Accuracy: As related to six degrees of freedom of a moving object.

Linear:

Flatness: Vertical deviation of a single point moving horizontally along a straight line.

Straightness: Horizontal deviation of a single point moving horizontally along a straight line.

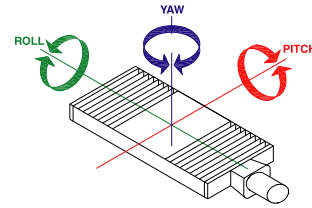
Parallelism: Vertical deviation of a moving element, as related to the stationary base

Angular:

Pitch: Rotation about the horizontal (Y) axis perpendicular to the axis of travel.

Yaw: Rotation about the vertical (Z) axis perpendicular to the axis of travel.

Roll: Rotation about the axis (X) of motion.



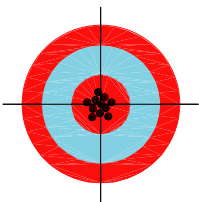
X-Y errors:

Abbe Error: angular error when workpiece plane, workpiece and measurement axis are not parallel.

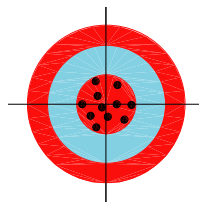
Orthogonality: Perpendicularity of two axis, measured in arc seconds

Positional Accuracy: Maximum allowable error between commanded position and the actual position.

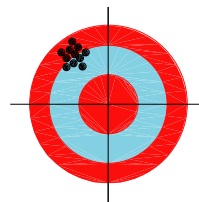
ACCURATE, REPEATABLE



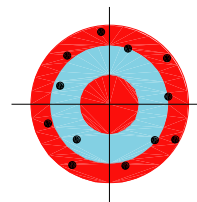
ACCURATE, NOT REPEATABLE



NOT ACCURATE, REPEATABLE



NOT ACCURATE, NOT REPEATABLE



Positional Repeatability: Maximum allowable positional variance (bidirectional) when returned to a previously commanded position

Critical Speed Limit: Rotational speed at which a screw will experience excessive vibration or “whipping”

Resolution: Smallest increment of motion that can be detected by a control system

Backdriving: formula = load x screw lead x Screw efficiency / 2pi (6.2832) = in/lbs torque holding force required to prevent back driving. Screw is self locking if the coefficient of friction is greater than the tangent of the lead angle. Generally, when the screw lead is less than 1/3 the diameter, backdriving will not occur.

Ballscrew: recirculating assembly used for higher speed (800+ rpm) applications with greater axial loading requirements.

Leadscrew: non-recirculating assembly used in applications where smooth, noiseless, and high repeatability are required. Certain types of leadscrew assemblies may be used in high speed applications. Please consult ALM Engineering.

Rolled Thread: low cost, lower accuracy roll die formed thread. Preload of nut determines smoothness and repeatability of assembly.

Ground Thread: high cost, high accuracy ground thread with preloaded nut assembly. Features zero axial play, smooth motion and minimal torque variance.

Stage Life Expectancy: Estimate based on application duty cycle, load type, lubrication, maintenance, environment, speed, etc. Please contact ALM Engineering for estimates.

Screw Accuracy Grade: Accumulated travel deviation per 300mm of thread length. [C3 = 8 μm (.0003”) ; C7 = 75 μm (.003”)]

Torque Required Formula = load x screw lead / Screw efficiency x 2pi (6.2832) = in/lbs torque

Screw Lead: Linear displacement with 1 revolution of screw.

Screw Pitch: threads per inch or number of revolutions required to advance nut 1 inch.

Backlash: The clearance between mechanical elements in the drive train which produce a “dead zone” when changing direction.

ENGINEERING CONSIDERATIONS AND TERMINOLOGY (CONT.)

Hysteresis: Counter force stored in an elastic material after an outside force acting upon it have been changed. ie: windup in a leadscrew assembly.

Torsional Wind-up: An element of hysteresis in a lead screw system. ie: When torque is applied a circular stress is produced, causing the driven end to rotate further than the outboard end.

Coefficient Of Friction: Ratio of the force required to move a given load to the magnitude of that load.

Inverted Load: Horizontal loading with stage in “Ceiling Mount” attitude.

APPLICATION NOTES

Description	Axis #1	Axis #2	Axis #3
Travel			
Load (Lbs.)			
Speed			
Straight Line			
Flatness Accuracy			
Positional Accuracy			
Repeatability			
Plane of Operation (horiz., vert.)			
Resolution			
Environment			
Temperature			
Space Restrictions			
Duty Cycle (give cycle details)			
Home Limit Switches (Type)			

Application Description: (please give details)

See How To Order On Page 17