

**RGS08 Series Linear Rail for Heavier Weight Applications with Hybrid 57000 Series Size 23 Linear Actuator Stepper Motors**

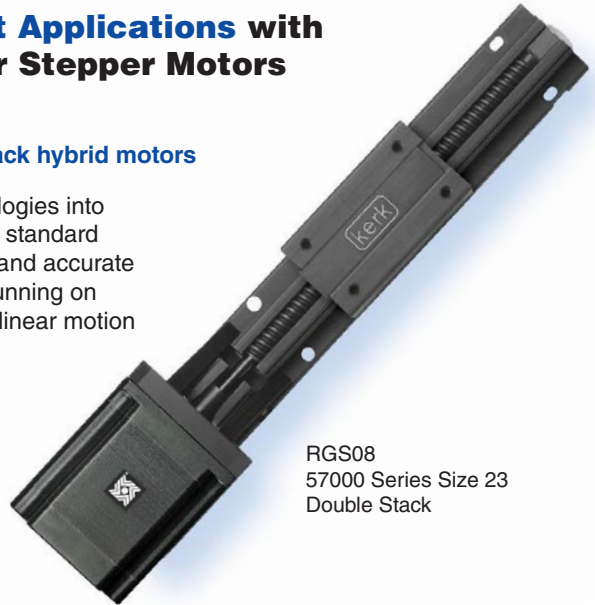
**RG Series** linear rails are available:

- **RGS08 Motorized with 57000 Series Size 23 Single and Double Stack hybrid motors**

A combination of Haydon Kerk Motion Solutions patented motion technologies into a single integrated, linear motion control system. RGS linear rails feature standard wear-compensating, anti-backlash driven carriages to insure repeatable and accurate positioning. All moving surfaces include Kerkite<sup>®</sup> engineered polymers running on Kerkote<sup>®</sup> TFE coating, providing a strong, stable platform for a variety of linear motion applications.

Technical specifications for 57000 Series Size 23 Hybrid Linear Actuator Stepper Motors are on page 3.

To determine what is best for your application see the Linear Rail Applications Checklist on page 5.



RGS08  
 57000 Series Size 23  
 Double Stack

**Identifying the Motorized RGS part number codes when ordering**

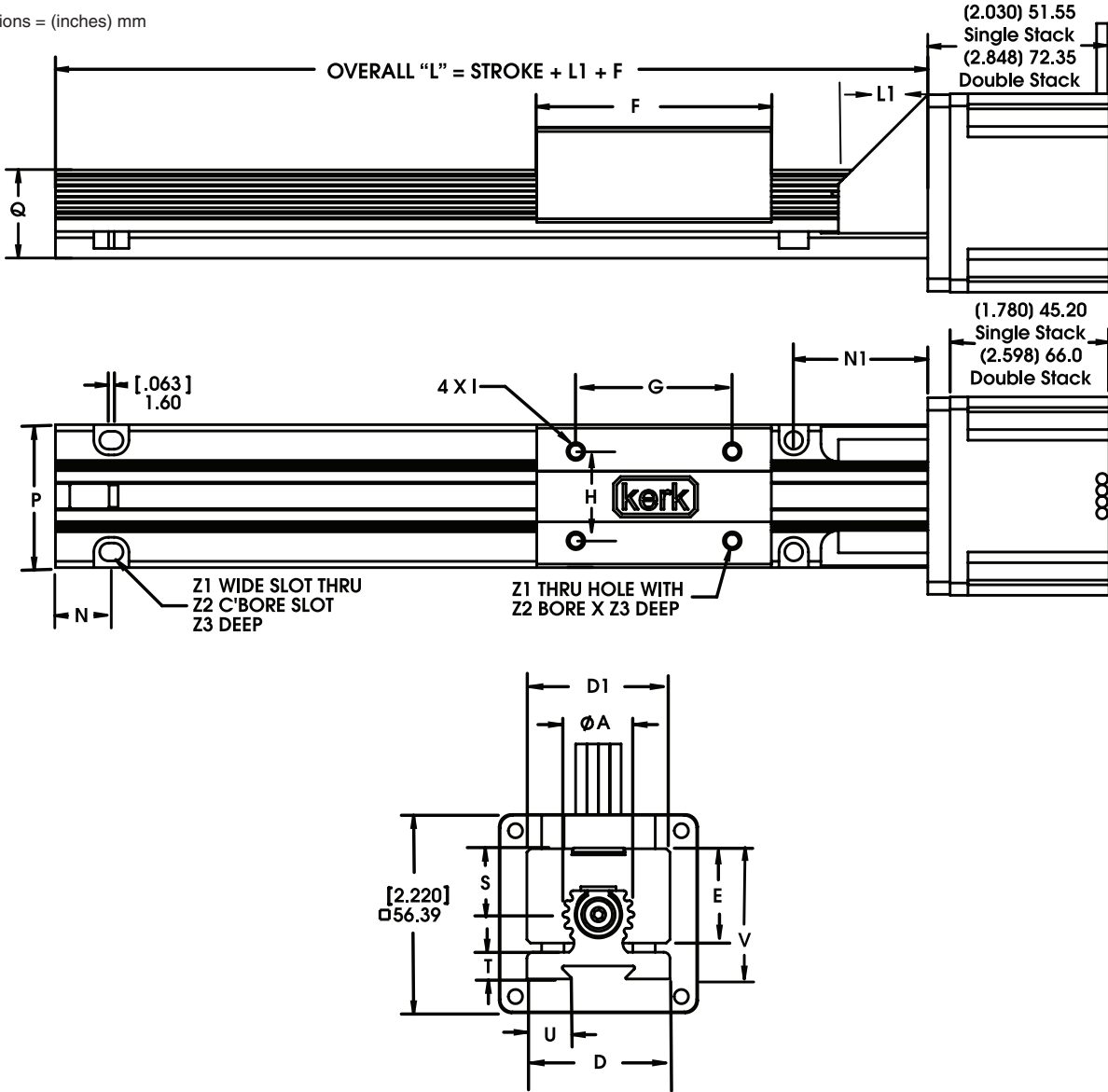
<b>RG</b>	<b>S</b>	<b>08</b>	<b>K</b>	-	<b>M</b>	<b>0100</b>	-	<b>XXX</b>
<b>Prefix</b>	<b>Frame Style</b>	<b>Frame Size Load</b>	<b>Coating</b>		<b>Drive / Mounting</b>	<b>Nominal Thread Lead Code</b>		<b>Unique Identifier</b>
<b>RG</b> = Rapid Guide Screw	<b>S</b> = Standard	<b>08</b> = 50 lbs (222 N) (Maximum static load)	<b>K</b> = TFE Kerkote <sup>®</sup> <b>X</b> = Special (example: Kerkote with grease)		<b>M</b> = Motorized	<b>0098</b> = .098-in (2.50) <b>0100</b> = .100-in (2.54) <b>0197</b> = .197-in (5.00) <b>0200</b> = .200-in (5.08) <b>0500</b> = .500-in (12.70) <b>0630</b> = .630-in (16.00) <b>1000</b> = 1.000-in (25.4)		Suffix used to identify specific motors (57000 Single/ Double Stack  - or a proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

**Carriage holes available in Metric sizes**  
**M3**  
**M4**  
**M5**  
**M6**

**NOTE:** Dashes must be included in Part Number (-) as shown above. For assistance or order entry, call our engineering team at 603 213 6290.

**RGS08<sup>®</sup> with 57000 Series Size 23 Single and Double Stack linear motors**  
**Recommended for horizontal loads up to 50 lbs (222 N)**

Dimensions = (inches) mm



	A	D	D1	E	F	G	H	I*	L1	N	N1	P	Q	S	T	U	V	Z1	Z2	Z3
(inch)	(0.8)	(1.6)	(1.6)	(1.06)	(2.7)	(1.75)	(1.0)	10-24	(1.0)	(0.625)	(1.5)	(1.25)	(1.0)	(0.74)	(0.3)	(0.51)	(1.47)	(0.2)	(0.33)	(0.19)
mm	20.3	40.6	40.6	26.9	68.6	44.5	25.4	UNC	25.4	15.9	38.1	15.9	25.4	18.8	7.6	12.9	37.3	5.1	8.4	4.8

\* Metric threads also available for carriage.

**Specifications: Haydon® 57000 Series Size 23 Single Stack**

Size 23: 57 mm (2.3-in) Hybrid External Linear Actuator (1.8° Step Angle)					
Wiring	Bipolar			Unipolar**	
Winding Voltage	3.25 VDC	5 VDC	12 VDC	5 VDC	12 VDC
Current (RMS)/phase	2.0 A	1.3 A	.54 A	1.3 A	.54 A
Resistance/phase	1.63 Ω	3.85 Ω	22.2 Ω	3.85 Ω	22.2 Ω
Inductance/phase	3.5 mH	10.5 mH	58 mH	5.3 mH	23.6 mH
Power Consumption	13 W				
Rotor Inertia	166 gcm <sup>2</sup>				
Insulation Class	Class B (Class F available)				
Weight	18 oz (511 g)				
Insulation Resistance	20 MΩ				

Standard motors are Class B rated for maximum temperature of 130°C.

\*\* Unipolar drive gives approximately 30% less thrust than bipolar drive.

**Specifications: Haydon® 57000 Series Size 23 Double Stack**

Size 23: 57 mm (2.3-in) Double Stack Hybrid External Linear Actuator (1.8° Step Angle)			
Wiring	Bipolar		
Winding Voltage	3.25 VDC	5 VDC	12 VDC
Current (RMS)/phase	3.85 A	2.5 A	1 A
Resistance/phase	0.98 Ω	2.0 Ω	12.0 Ω
Inductance/phase	2.3 mH	7.6 mH	35.0 mH
Power Consumption	25 W Total		
Rotor Inertia	332 gcm <sup>2</sup>		
Insulation Class	Class B (Class F available)		
Weight	32 oz (958 g)		
Insulation Resistance	20 MΩ		



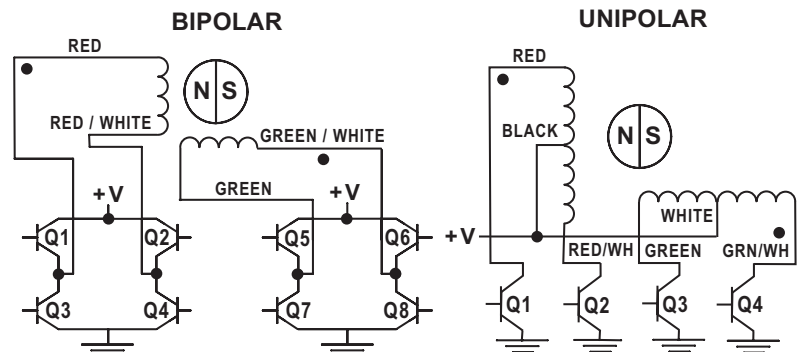
**Hybrids: Stepping Sequence**

	Bipolar	Q2-Q3	Q1-Q4	Q6-Q7	Q5-Q8
Unipolar	Q1	Q2	Q3	Q4	
Step					
1	ON	OFF	ON	OFF	
2	OFF	ON	ON	OFF	
3	OFF	ON	OFF	ON	
4	ON	OFF	OFF	ON	
1	ON	OFF	ON	OFF	

↑ RETRACT CCW  
 ↓ EXTEND CW

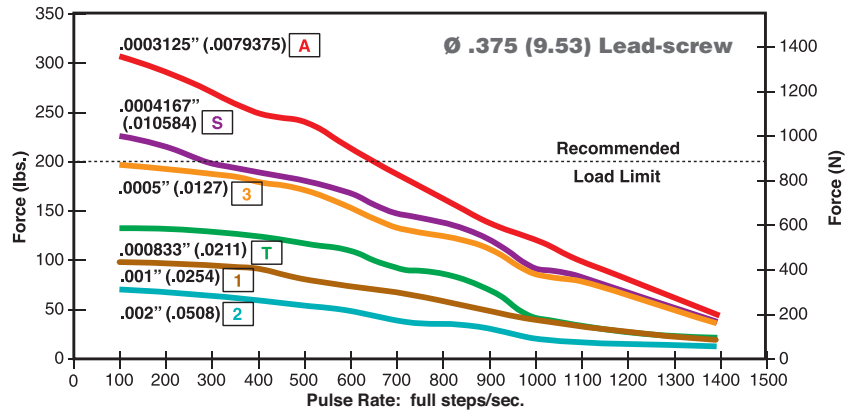
**Note:** Half stepping is accomplished by inserting an off state between transitioning phases.

**Hybrids: Wiring**

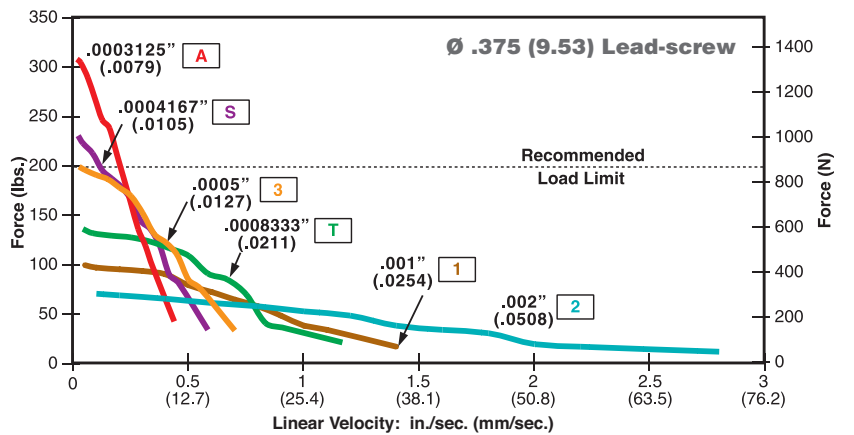


**Performance Curves:  
 Haydon® 57000 Series  
 Size 23 Single Stack**

**FORCE vs. PULSE RATE**  
 Chopper • Bipolar  
 100% Duty Cycle

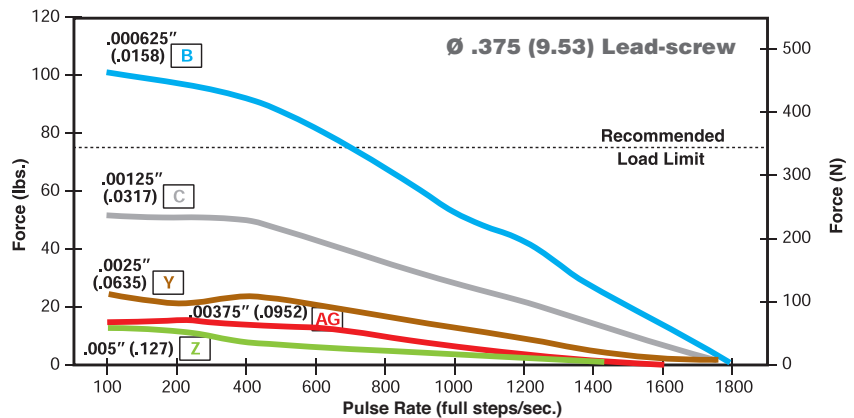


**FORCE vs. LINEAR VELOCITY**  
 Chopper • Bipolar  
 100% Duty Cycle

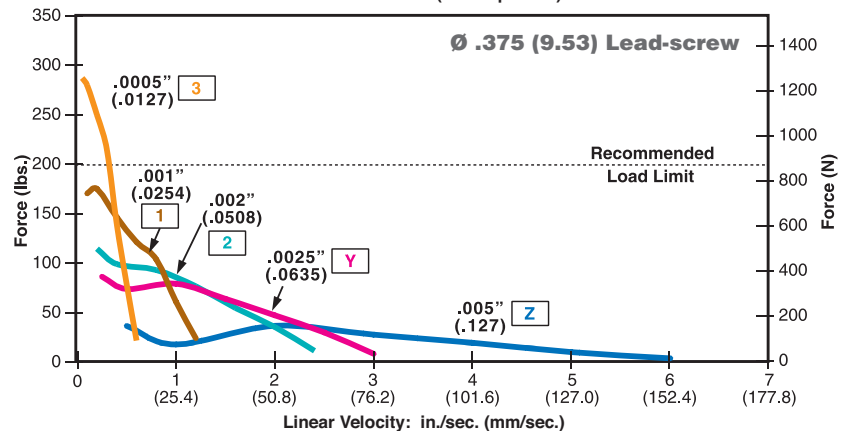


**Performance Curves:  
 Haydon® 57000 Series  
 Size 23 Double Stack**

**FORCE vs. PULSE RATE**  
 Chopper • Bipolar  
 100% Duty Cycle



**FORCE vs. LINEAR VELOCITY**  
 Chopper • Bipolar  
 100% Duty Cycle



NOTE: All chopper drive curves were created with a 5 volt motor and a 40 volt power supply.  
 Ramping can increase the performance of a motor either by increasing the top speed or getting a heavier load accelerated up to speed faster. Also, deceleration can be used to stop the motor without overshoot.  
 With L/R drives peak force and speeds are reduced, using a unipolar drive will yield a further 30% force reduction.

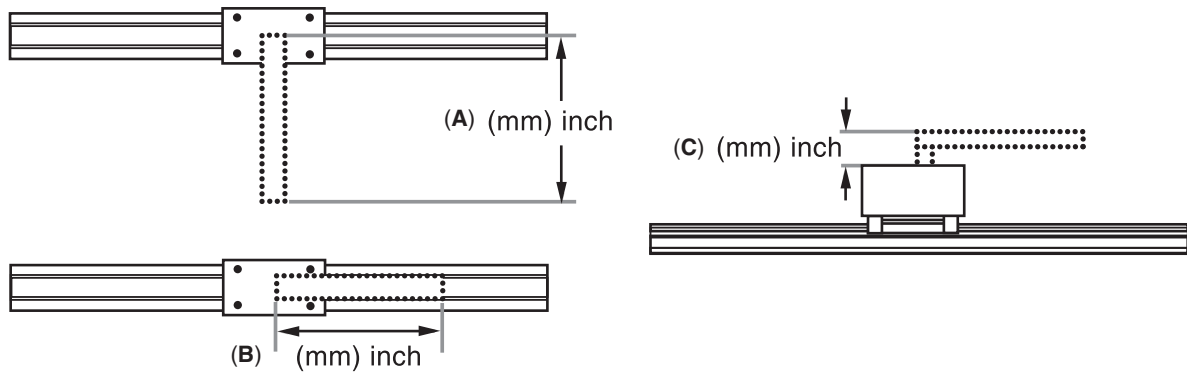
### Information needed to properly size a linear rail system

Haydon Kerk™ Linear Rail Systems are designed to be **precision motion devices**. Many variables must be considered before applying a particular rail system in an application. The following is a basic checklist of information needed that will make it easier for the Haydon Kerk engineering team to assist you in choosing the proper linear rail.

## Linear Rail Application Checklist

- 1)  **Maximum Load?** \_\_\_\_\_ (N or lbs.)
- 2)  **Load Center of Gravity (cg) Distance and Height** (mm or inches)? See illustrations (A) (B) (C) below.  
**Dimensions** ( mm /  inch):

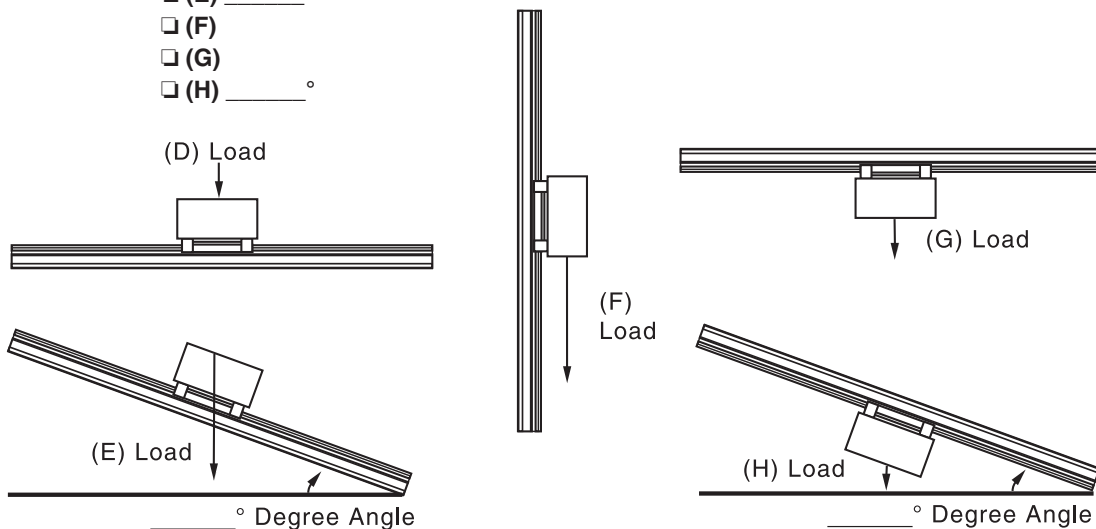
(A) \_\_\_\_\_ ... OR...  (B) \_\_\_\_\_ AND...  (C) \_\_\_\_\_



- 3)  **Rail Mount Orientation?** The force needed to move the load is dependent on the orientation of the load relative to the force of gravity. For example, total required force in the horizontal plane (D) is a function of friction and the force needed for load acceleration ( $F_f + F_a$ ). Total force in the vertical plane is a function of friction, load acceleration, and gravity ( $F_f + F_a + F_g$ ).

**Orientation:**

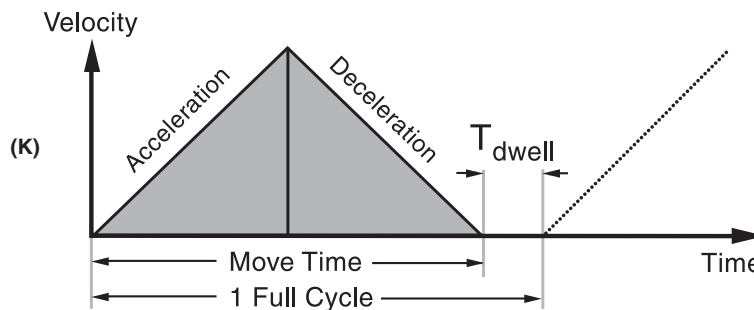
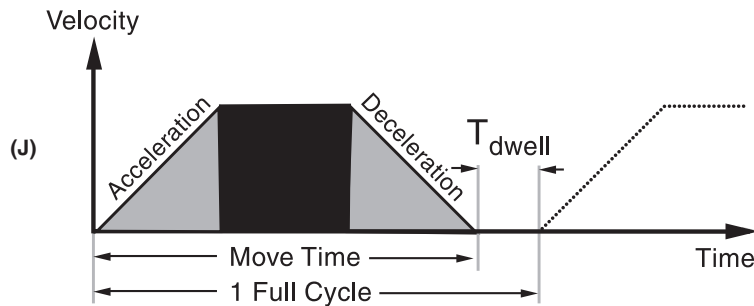
- (D)  
 (E) \_\_\_\_\_ °  
 (F)  
 (G)  
 (H) \_\_\_\_\_ °



**Linear Rail Application Checklist** (Continued)

4)  **Stroke Length to Move Load?** \_\_\_\_\_ (mm or inches)  
 Overall rail size will be a function of stroke length needed to move the load, the rail frame size (load capability), the motor size, and whether or not an integrated stepper motor programmable drive system is added.

5)  **Move Profile?**  
 A **trapezoidal** move profile divided into 3 equal segments (J) is a common move profile and easy to work with. Another common move profile is a **triangular** profile divided into 2 equal segments (K).



If using a **trapezoidal** (J) or **triangular** (K) move profile, the following is needed...

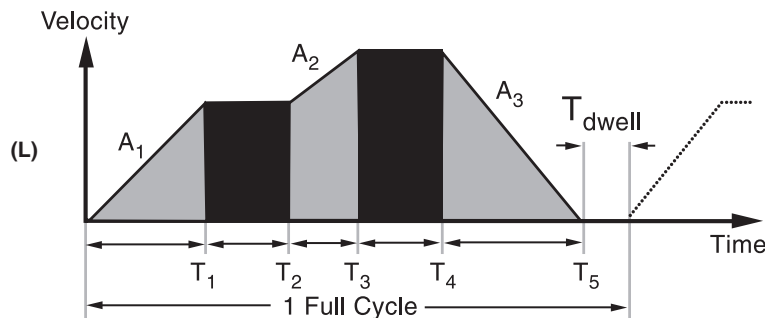
- a)  Point to point move distance \_\_\_\_\_ (mm or inches)
- b)  Move time \_\_\_\_\_ (seconds) including time of acceleration and deceleration
- c)  Dwell time between moves \_\_\_\_\_ (seconds)

The trapezoidal move profile (J) is a good starting point in helping to size a system for prototype work.

A **complex** move profile (L) requires more information.

- a)  Time (in seconds) including:  $T_1, T_2, T_3, T_4, T_5 \dots T_n$  and  $T_{dwell}$
- b)  Acceleration / Deceleration ( $\text{mm}/\text{sec}^2$  or  $\text{inches}/\text{sec}^2$ ) including:  $A_1, A_2, A_3 \dots A_n$

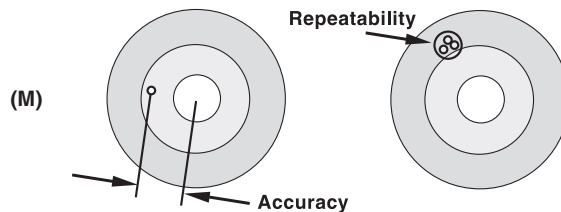
For more information call Haydon Kerk Motion Solutions Engineering at 203 756 7441.



**Linear Rail Application Checklist** (Continued)

6)  **Position Accuracy Required?** \_\_\_\_\_ (mm or inches)  
 Accuracy is defined as the difference between the theoretical position and actual position capability of the system. Due to manufacturing tolerances in components, actual travel will be slightly different than theoretical "commanded" position. See figure (M) below.

7)  **Position Repeatability Required?** \_\_\_\_\_ (mm or inches)  
 Repeatability is defined as the range of positions attained when the rail is commanded to approach the same position multiple times under identical conditions. See figure (M) below.



8)  **Positioning Resolution Required?** \_\_\_\_\_ (mm/step or inches/step)  
 Positioning resolution is the smallest move command that the system can generate. The resolution is a function of many factors including the drive electronics, lead screw pitch, and encoder (if required). The terms "resolution" and "accuracy" should never be used interchangeably.

9)  **Closed-Loop Position Correction Required?**  YES  NO  
 In stepper motor-based linear rail systems, position correction is typically accomplished using a rotary incremental encoder (either optical or magnetic).

10)  **Life Requirement?** (select the most important application parameter)  
 a)  Total mm or inches \_\_\_\_\_  
 ... or ... b)  Number of Full Strokes \_\_\_\_\_  
 ... or ... c)  Number of Cycles \_\_\_\_\_

11)  **Operating Temperature Range** \_\_\_\_\_ (°C or °F)  
 a)  Will the system operate in an environment in which the worst case temperature is above room temperature?  
 b)  Will the system be mounted in an enclosure with other equipment generating heat?

12)  **Controller / Drive Information?**  
 a)  Haydon Kerk IDEAT<sup>™</sup> Drive (with Size 17 Stepper Motors only)  
 b)  Customer Supplied Drive... Type?  Chopper Drive  L / R Drive  
 Model / Style of Drive: \_\_\_\_\_

13)  **Power Supply Voltage?** \_\_\_\_\_ (VDC)

14)  **Step Resolution?** a)  Full Step b)  Half-Step c)  Micro-Step

15)  **Drive Current?** \_\_\_\_\_ (A<sub>rms</sub> / Phase) and \_\_\_\_\_ (A<sub>peak</sub> / Phase)

16)  **Current Boost Capability?** \_\_\_\_\_ (%)