HAYDON: 203 756 7441
KERK: 603 213 6290
www.haydonkerkpittman.com

AMETEK®
ADVANCED MOTION SOLUTIONS

Haydon kerk®
Motion Solutions

RGS08® Linear Rails:
RGS08 Motorized
57000 Series Size 23

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® engineered polymers running on Kerkote® 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*

RG	S	08	K	–	M	0100	–	XXX

Prefix

RG = Rapid Guide Screw

Frame Style

S = Standard

Frame Size Load

08 = 50 lbs (222 N) (Maximum static load)

Carriage holes available in Metric sizes
M3
M4
M5
M6

Coating

K = TFE Kerkote®

X = Special (example: Kerkote with grease

Drive / Mounting

M = Motorized

Nominal Thread Lead Code

0098 = .098-in (2.50)
0100 = .100-in (2.54)
0197 = .197-in (5.00)
0200 = .200-in (5.08)
0500 = .500-in (12.70)
0630 = .630-in (16.00)
1000 = 1.000-in (25.4)

Unique Identifier

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.

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

HAYDON: 203 756 7441
KERK: 603 213 6290
www.haydonkerkpittman.com

AMETEK®
ADVANCED MOTION SOLUTIONS

Haydon kerk
Motion Solutions

RGS08® Linear Rails:
RGS08 Motorized 57000 Series
Dimensional Drawings

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

Dimensions = (inches) mm

OVERALL "L" = STROKE + L1 + F
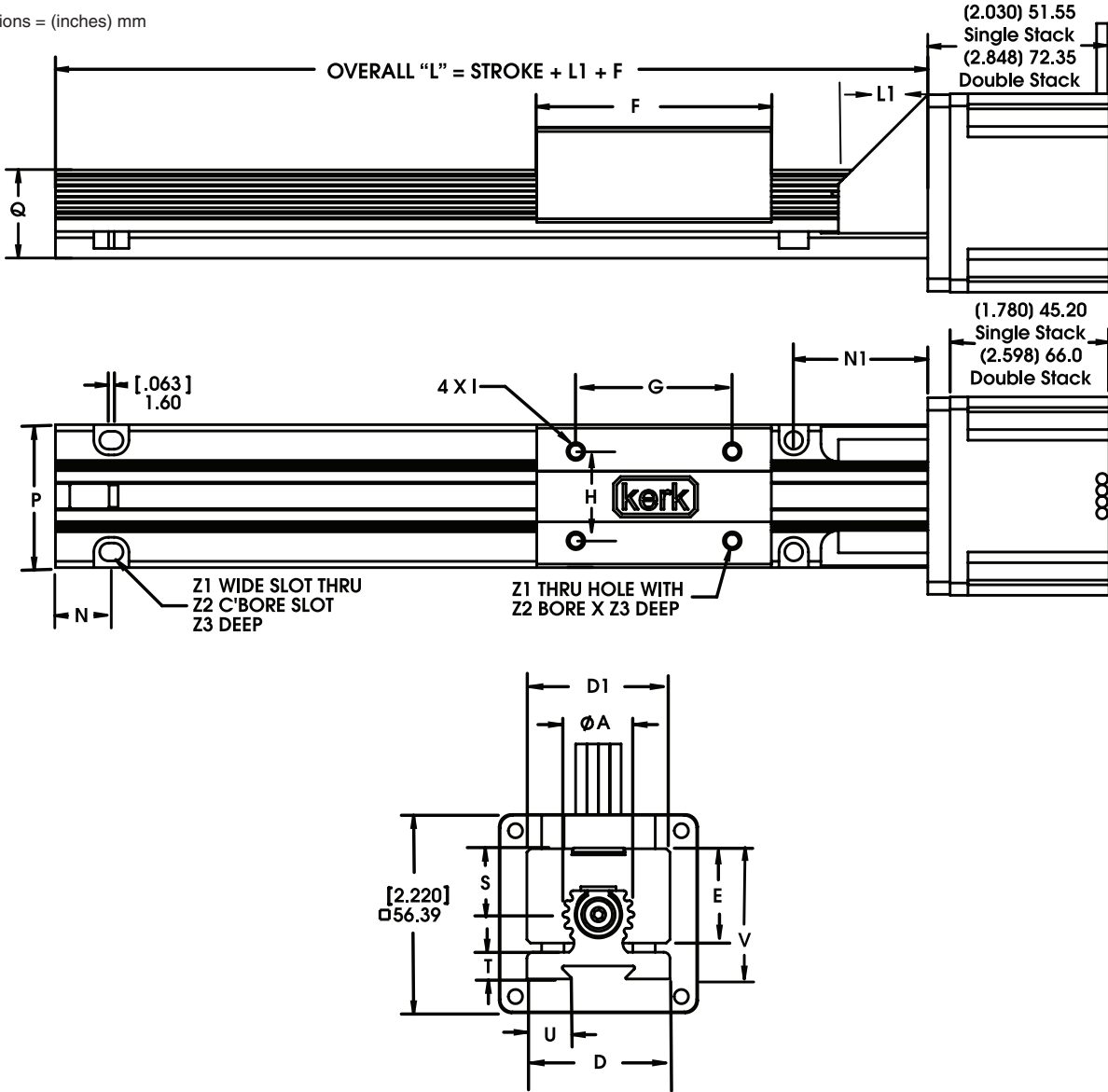
(2.030) 51.55 Single Stack
(2.848) 72.35 Double Stack

(1.780) 45.20 Single Stack
(2.598) 66.0 Double Stack

[.063] 1.60

4 X I

Z1 WIDE SLOT THRU
Z2 C'BORE SLOT
Z3 DEEP

Z1 THRU HOLE WITH
Z2 BORE X Z3 DEEP

[2.220] □56.39

* Metric threads also available for carriage.

	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 UNC	(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		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.

2

HAYDON: 203 756 7441
KERK: 603 213 6290
www.haydonkerkpittman.com

AMETEK®
ADVANCED MOTION SOLUTIONS

Haydon kerk®
Motion Solutions

RGS08® Linear Rails:
RGS08 57000 Series Size 23
Motor Specifications

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^2				
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^2		
Insulation Class	Class B (Class F available)		
Weight	32 oz (958 g)		
Insulation Resistance	20 MΩ		

57000 Series
Size 23
Single Stack
External Linear

57000 Series
Size 23
Double Stack
External Linear

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

EXTEND CW ↓   RETRACT CCW ↑

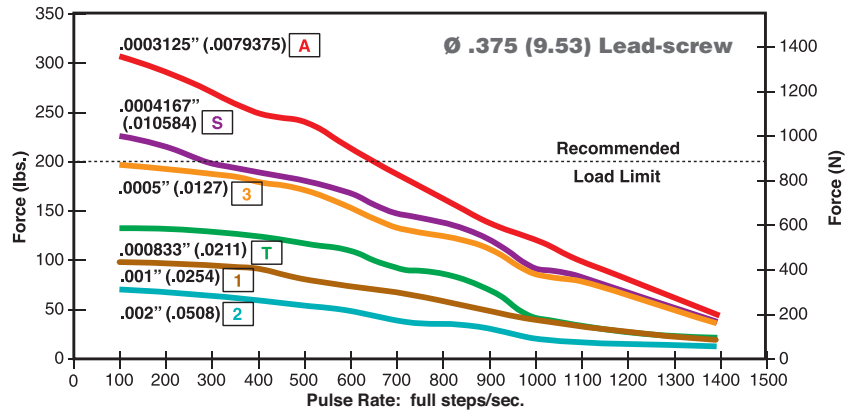**Note:** Half stepping is accomplished by inserting an off state between transitioning phases.
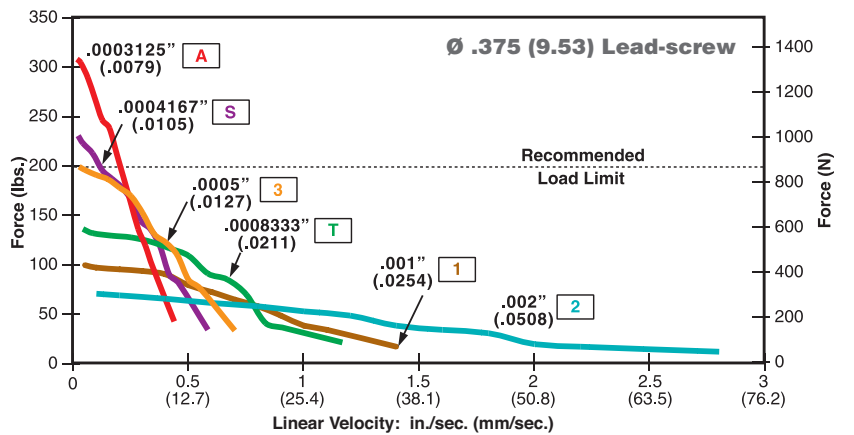
Hybrids: Wiring

BIPOLAR

RED
RED / WHITE
GREEN / WHITE
GREEN
+V
Q1 Q2
Q3 Q4
Q5 Q6
Q7 Q8

UNIPOLAR

RED
BLACK
WHITE
+V
RED/WH GREEN GRN/WH
Q1 Q2 Q3 Q4

HAYDON: 203 756 7441
KERK: 603 213 6290
www.haydonkerkpittman.com

AMETEK®
ADVANCED MOTION SOLUTIONS

Haydon **kerk** ®
Motion Solutions

RGS08® Linear Rails:
RGS08 Motorized 57000 Series
Performance Curves
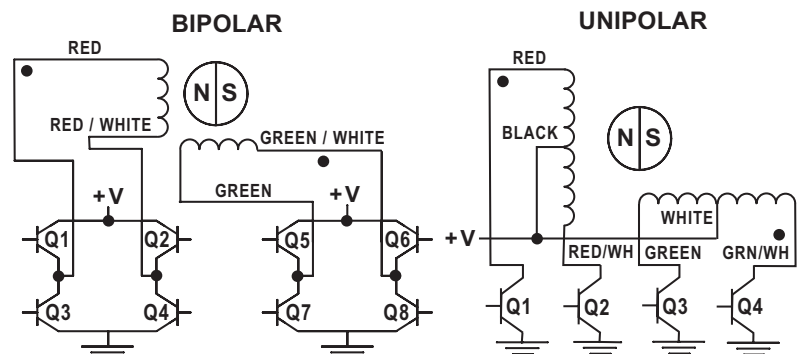
Performance Curves:
Haydon® 57000 Series
Size 23 Single Stack

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

Ø .375 (9.53) Lead-screw

Pulse Rate: full steps/sec.

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

Ø .375 (9.53) Lead-screw

.0003125" (.0079) A
.0004167" (.0105) S
.0005" (.0127) 3
.0008333" (.0211) T
.001" (.0254) 1
.002" (.0508)

Recommended Load Limit

Force (lbs.) — Force (N)

Linear Velocity: in./sec. (mm/sec.)

Performance Curves:
Haydon® 57000 Series
Size 23 Double Stack

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

Ø .375 (9.53) Lead-screw

Pulse Rate (full steps/sec.)

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

Ø .375 (9.53) Lead-screw

.0005" (.0127) 3
.001" (.0254)
.002" (.0508) 2
.0025" (.0635) Y
.005" (.127) Z

Recommended Load Limit

Force (lbs.) — Force (N)

Linear Velocity: in./sec. (mm/sec.)
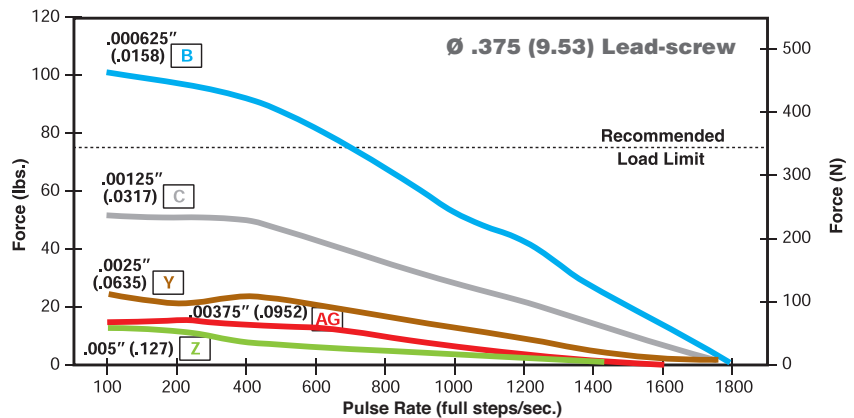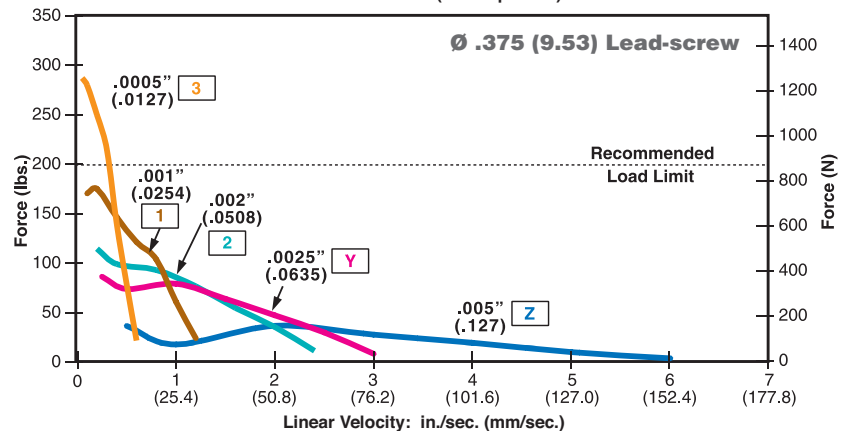
NOTE: All chopper drive curves were created with a 5 volt motor and a 40 volt power supply.

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.

HAYDON: 203 756 7441
KERK: 603 213 6290
www.haydonkerkpittman.com

AMETEK ®
ADVANCED MOTION SOLUTIONS

Haydon kerk ®
Motion Solutions

Linear Rails:
*Properly Sizing A Linear Rail System*

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)** _____

(A) (mm) inch

(C) (mm) inch

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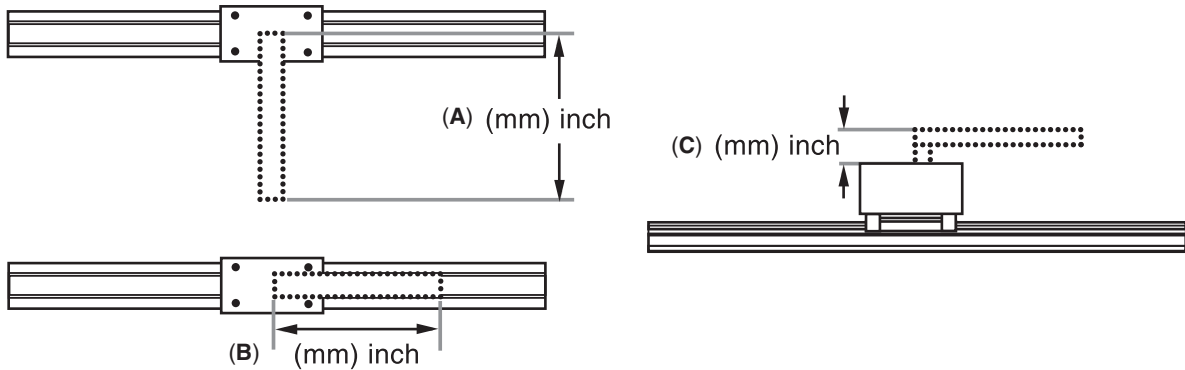
3) ❏ **Rail Mount Orientation?** The force needed to move the load is dependent on the orientation of the load relative to the force of gravity. For example, total required force in the horizontal plane (D) is a function of friction and the force needed for load acceleration ($F_f + F_a$). Total force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

(D) Load

(F) Load

(G) Load

(E) Load
_____° Degree Angle

(H) Load
_____° Degree Angle

HAYDON: 203 756 7441
KERK: 603 213 6290
www.haydonkerkpittman.com

AMETEK®
ADVANCED MOTION SOLUTIONS

Haydon **kerk**®
Motion Solutions

Linear Rails:
Properly Sizing A Linear
Rail System
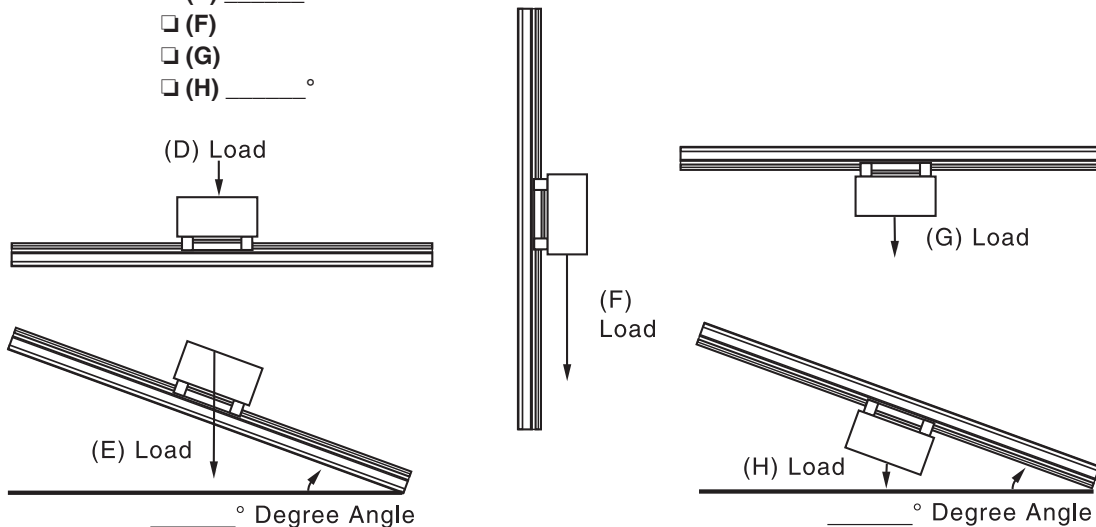
Linear Rail Application Checklist *(Continued)*

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).
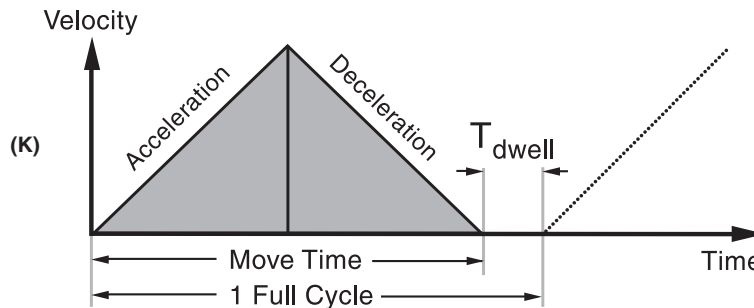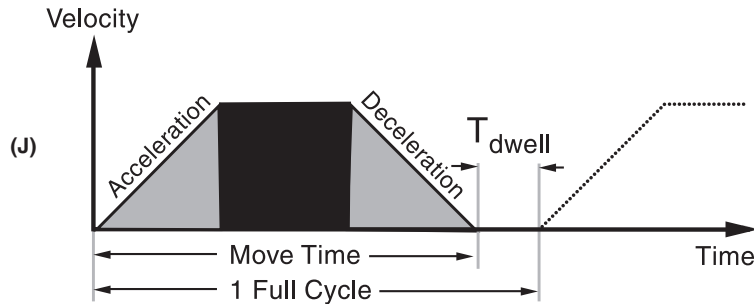
If using a **trapezoidal** (J) or **triangular** (K) move profile, the following is needed…
   a) ❏ Point to point move distance _____ (mm or inches)
   b) ❏ Move time _____ (seconds) including time of acceleration and deceleration
   c) ❏ Dwell time between moves _____ (seconds)

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: $T_1, T_2, T_3, T_4, T_5…T_n$ and T_{dwell}
   b) ❏ Acceleration / Deceleration (mm/sec.^{2} or inches/sec.^{2}) including: $A_1, A_2, A_3…A_n$

For more information call Haydon Kerk Motion Solutions Engineering at 203 756 7441.
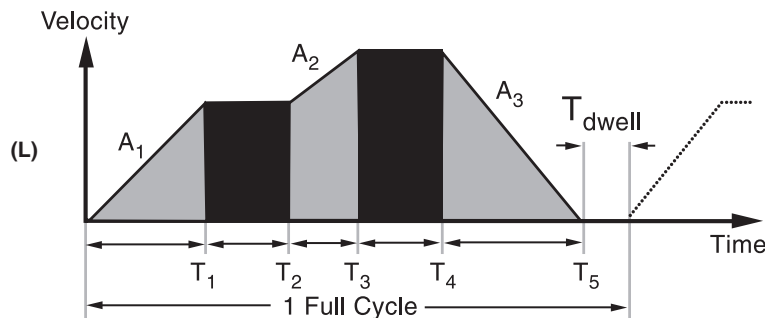
Linear Rail *Application Checklist* (Continued)

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.

(M)
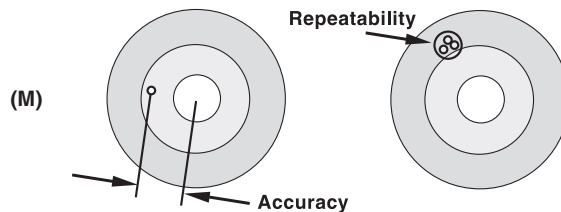
8) ❑ **Positioning Resolution Required?** _____ (mm/step or inches/step)
Positioning resolution is the smallest move command that the system can generate. The resolution is a function of many factors including the drive electronics, lead screw pitch, and encoder (if required). The terms "resolution" 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 IDEA™ 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_{rms} / Phase) and _____ (A_{peak} / Phase)

16) ❑ **Current Boost Capability?** _____ (%)