Linear Rail Checklist

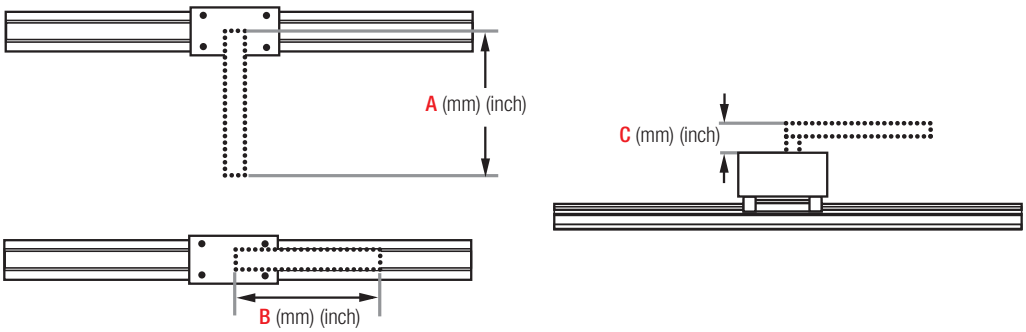
Information needed to properly size a linear rail system

Our 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 Pittman Engineering Team to assist you in choosing the proper linear rail. See **order form** on page 4.

1. ☐ Maximum Load? _____ (N or lbs.)

2. ☐ Load Center of Gravity (cg) Distance and Height (mm or inches)? See illustrations (**A**) (**B**) (**C**) below.

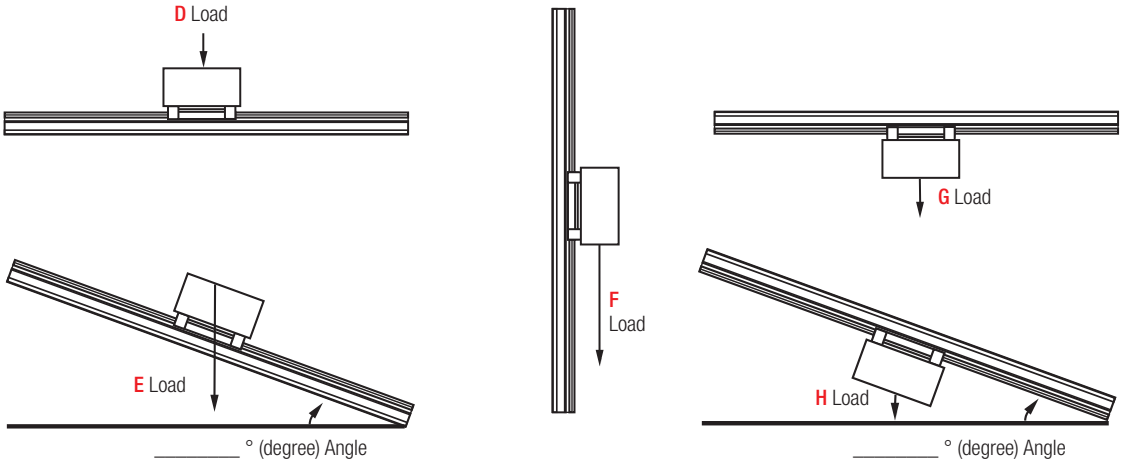
   Dimensions: ☐ mm or ☐ inch ☐ A _____, or ☐ B _____ and ☐ C _____



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 _____ ☐ F _____ ☐ G _____

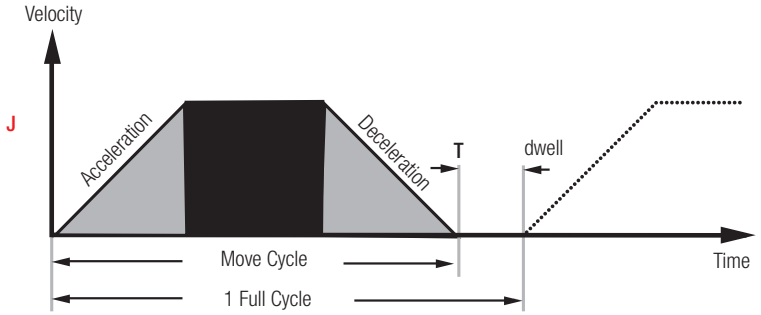
   ☐ E _____ ° ☐ H _____ °

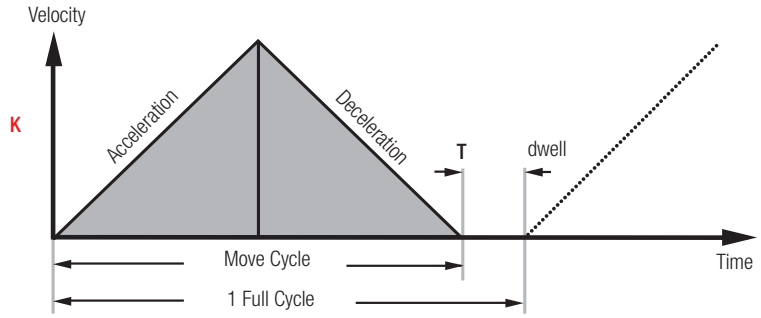


4. ☐ Stroke Length to Move Load? _____ (mm or inches)

   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

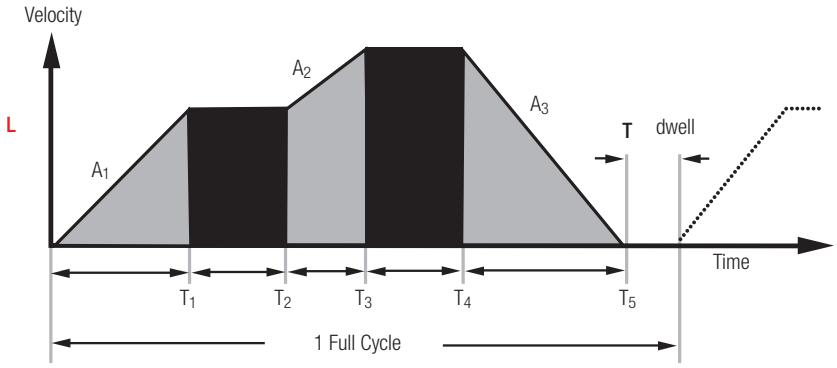
c. ☐ Dwell time between moves _____ (seconds)

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.

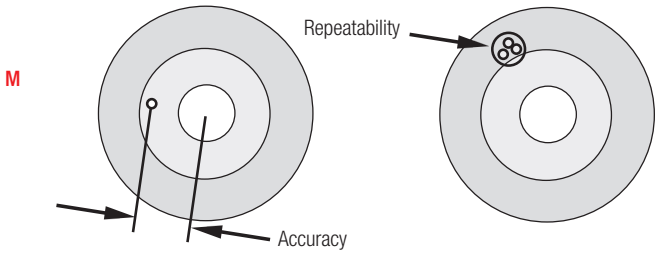
a. ☐ Time (in seconds) including: T_1, T_2, T_3, T_4, $T_5 \ldots T_n$ and T_{dwell}

b. ☐ Acceleration / Deceleration (mm/sec.^{2} or inches/sec.^{2}) including: A_1, A_2, $A_3 \ldots A_n$



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 **M**.

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 **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?* _____ (%)

*NOTE: If the Haydon Kerk IDEA™ Drive is used with 43000 Series Size 17 linear actuator stepper motor disregard items 14, 15, and 16.

Linear Rail Application Checklist

Upon completion, email to: info.haydonkerk@ametek.com

Name _____ **Company** _____

Address _____ **City** _____ **State** _____ **Zip** _____

Country _____ **Phone** _____ **Email** _____

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 or ☐ 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 _____°

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.

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   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: $T_1, T_2, T_3, T_4, T_5 \ldots T_n$ and T_{dwell}

   b. ☐ Acceleration / Deceleration (mm/sec.^{2} or inches/sec.^{2}) including: $A_1, A_1, A_1 \ldots A_n$

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 **M**.

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 **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.

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    a. ☐ Total mm or inches _____, or b. ☐ Number of Full Strokes _____, or c. ☐ Number of Cycles _____

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    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?* _____ (%)

*NOTE: If the Haydon Kerk IDEA™ Drive is used with 43000 Series Size 17 linear actuator stepper motor disregard items 14, 15, and 16.