GUIDE WHEEL-BASED LINEAR SLIDE SYSTEM FOR LOW CONTAMINATION AND HIGHLY CORROSIVE ENVIRONMENTS

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INTRODUCTION

Highly corrosive environments, clean rooms, and food processing lines present different operational challenges, but all are among the toughest applications for linear guide systems. Equipment used in highly corrosive environments must be composed of corrosion-resistant materials. If the equipment contains any materials that can react with the harsh chemicals in the environment, the equipment may become damaged and newly formed toxic or corrosive compounds may be introduced into the environment.

At the other extreme, clean rooms and food processing lines have some of the most demanding low-contamination requirements. Contamination in these applications can present serious problems to the product and other sensitive equipment. Therefore, the equipment involved in these applications is usually required to be comprised of non-hazardous materials and release as little material (liquid, solid, or gaseous) as possible during the course of operation. There are also environments that may combine elements of the three, such as clean rooms with corrosive agents present. Equipment used in such an environment may react with the corrosives and cause more particulate matter to be created and released into the environment.
THE BASICS OF A LINEAR GUIDE SYSTEM

Rolling element-based linear guide systems can present problems in these applications since they typically require grease or oil lubrication on their running surfaces for optimal performance. When the running surfaces are dry, attributes such as service life and smoothness generally decrease while noise and friction typically increase. The exposed lubrication can present an issue in highly corrosive environments if the lubrication is reactive with the corrosive agents. The exposed lubrication can also be an issue in clean room and food processing applications since it can become a contaminant if it gets ejected from the rail during rail/carriage motion or if contaminating vapors outgas from it.

Many plain bearing-based linear guide systems also require grease or oil lubrication for optimal performance, but some have dry lubricant impregnated on the running surfaces of the plain bearing. The dry lubricant can be more problematic than the “wet” lubricant in clean rooms since the dry lubricant can get dispersed more readily as airborne particulate. Also, plain bearing-based linear guide systems typically have lower load capacities and higher sliding friction than rolling element-based linear guide systems of similar size. Most plain bearing-based linear guide systems require the carriage to be mounted on multiple plain bearings and two parallel shafts. This is necessary to prevent the carriage from freely rotating on the shafts and to provide adequate moment load capacity. In these cases precise parallel alignment of the shafts to each other and the plain bearings to the carriage is necessary to prevent the plain bearings from binding at any point along their stroke.

A UNIQUE SOLUTION

A unique solution for applications like this is the HepcoMotion SL2 Linear Slide System. The SL2 is a guide wheel-based linear slide system that features 70° vee guide wheel-equipped carriages running on slides with dual 70° vee running surfaces. The SL2 system is distinctive in that it is designed to provide high load capacity and long operating life without slide lubrication, making it an excellent choice in clean room applications.
A UNIQUE SOLUTION (CONT’D)

This special attribute is due to the inherent low friction between the slide and guide wheel assemblies. Lubrication can be added to the slide to increase life and reduce friction, but due the low rolling friction between the slide and guide wheels, it is not necessary for satisfactory operation. The SL2 system is also suitable for highly corrosive environments since the slide and guide wheel assemblies are made from hardened stainless steel. The carriage is made from aluminum with a corrosion-resistant, USDA-approved surface treatment, but can also be made in stainless steel or other material by request.

Achievement of the desired carriage running characteristics can be further aided by the selection of the appropriate type of guide wheels for the carriage. Two wheel options are available for the SL2 system – twin bearing wheel assemblies (Figure 1) and double row bearing (Figure 2) wheel assemblies. The former is composed of two single row bearing guide wheels stacked together, while the latter is composed of one double row bearing guide wheel. The twin bearing wheel assembly provides more compliance, permitting more carriage misalignment while still providing low running friction. The double row bearing wheel assembly provides higher load capacity, operating speed, travel life, as well as reduced entrapment of foreign debris.

While the slide does not require lubrication, the guide wheels are internally lubricated with lithium grease to provide smooth motion and long wheel life. The guide wheels are lubricated for life and have nitrile rubber seals to minimize the cross-transmission of wheel lubricant and external contamination.
SUMMARY

Selection of an appropriate type of linear guide system is essential in applications with critical operational environments. A correctly chosen linear guide system will minimize maintenance requirements, component replacement frequency, application problems, and overall operation cost. For applications with low contamination and/or highly corrosive environments, the HepcoMotion SL2 linear slide system provides these benefits due to its dry slide operational capability, corrosion-resistant materials, and ease of installation and replacement.

TO LEARN MORE ABOUT LINEAR GUIDE SYSTEMS FOR CRITICAL OPERATIONAL ENVIRONMENTS, AS WELL AS VIEW EXAMPLE APPLICATION STORIES, SCAN THE QR CODE TO THE RIGHT.

ABOUT

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