

EASE OF ASSEMBLY & MAINTENANCE WITH LOW TOTAL COST OF OWNERSHIP

INTUITIVE DESIGNS FOR GUIDED MOTION WITH LOW TCO

Machines and equipment assembled from components that are difficult, time consuming to install or require frequent maintenance will end up costing more money over time. Some guided motion products may cost less money initially but wear out more quickly or fail prematurely resulting in increased cost over the service life of a machine.

Head-to-head competitive testing clearly identifies the significant differences in durability between similar products and prove a low total cost of ownership with the use of Bishop-Wisecarver® products.

Physical Design Maximizes Ease

The intuitive and simplified physical design of DualVee® linear motion components provide a significant reduction in the overall design complexity of a machine and a reduction in the time required during installation and adjustment resulting in an initial cost savings. Products that are easy to understand, require only common hand tools to assemble, and are adjusted with simple procedures allow assembly and maintenance in less time with less labor at a lower overall cost.

Fast, Easy & Accurate Installation

DualVee® guide wheel bearings and linear tracks contain design features that make mounting and adjusting fast, easy and accurate. Assembly and routine adjustments can be made with common hand tools such as thin open-end wrenches and hex keys.



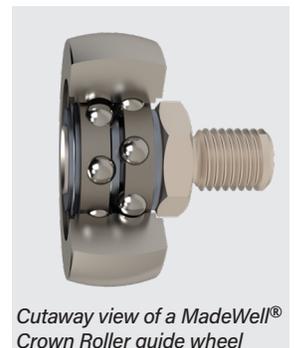
DualVee® Track

The linear tracks are cold drawn to shape and feature an integral mounting shoulder that is used as a reference edge for accurate alignment to a substrate or machine frame surface. Tracks can be mounted with a variety of standard bolt and screw hardware and are available with thru holes for top mounting or threaded holes for bottom mounting. Additional hole types are possible including countersinks and counterbores for even more creative mounting solutions.

Using a MadeWell® crown roller style guide wheel in combination with a vee guide wheel can greatly reduce the common occurrence of binding in parallel mounted linear guide tracks thus decreasing assembly time and effort. Vee wheels used on vee tracks will function as the precision datum reference plane while crown roller wheels used on



open profile tracks will tolerate misalignment making the combination an ideal solution for mounting surfaces that are not perfectly aligned, or when lower accuracy materials such as t-slot framing members are used. For more information, scan the QR code to watch a video Webinar: Design Guide to Eliminate Binding in Parallel inear Guides.



Cutaway view of a MadeWell® Crown Roller guide wheel

Simple Maintenance

Every machine requires periodic maintenance to ensure consistent and reliable operation during the expected lifespan. The guided motion products that are vital to the operation of packaging machinery and other industrial equipment will require periodic cleaning, inspection, preload adjustment, and relubrication during their service life. Simple maintenance procedures that are fast to perform can ensure a rapid return of the machine to operation reducing unwanted, unexpected and costly downtime.

Simple Maintenance (cont'd)

All linear guide wheel bearings and tracks wear during use and will become loose or less stiff over time.

DualVee® guide wheels with its innovative eccentric offset mounting features enable adjustment of the clearance and the preload between the wheel and track. This simple adjustment can restore the operation of worn linear motion parts to like new performance. Guide wheel bearings with double eccentric offset features allow for wider clearance between the wheel and track so that a wheel plate assembly can be completely removed from a length of linear guide track without extensive disassembly.



When it's time for the motion components to be replaced, either the wheel or the track can be replaced individually with a new product rather than requiring a complete set. The DualVee® linear guide tracks are typically mounted with bolts and screws that are removeable with the same common hand tools that are needed during the initial assembly and installation.

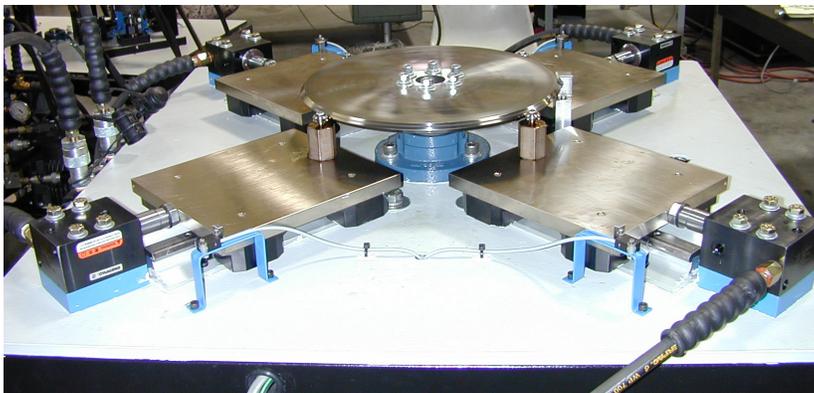
A light film coating of clean lubrication oil is recommended on the track surfaces where the guide wheels make contact. When there are no longer any traces of oil, the motion components should be relubricated. Oil can be reapplied to wiper felts and wheel cover felts using a bottle or a syringe. Alternately, an oil saturated towel or shop rag can be used to reapply the lubrication to the track surfaces. This important maintenance task is fast, easy to perform and will ensure lower friction, a reduction in the wear rate, and helps to provide a long and consistent service life.

Durability Testing

Numerous guided motion technologies are available in the market today and many of these products appear similar or even identical in shape, size, and specification. However, there are vastly different real-world performance characteristics between seemingly similar products. Industry utilization on generations of production machinery and head-to-head competitive testing can easily identify the significant differences between the durability of visually similar motion products.

Laboratory Test of Vee Guide Wheels

Competitive testing of stainless steel vee groove linear guide wheels was conducted at the maximum radial load capacity and compared against the calculated travel life using each manufacturers published load ratings and life calculation equations. As a reference, the Bishop-Wisecarver® size 2 wheel is rated for 596 lbs. at 87km travel life.



Radial Load Testing Machine

The test apparatus applied the full rated load and ran each guide wheel at a speed of 2 meters per second for a duty cycle interval of 40 minutes which equates to a travel distances of 5 kilometers. After each interval the wheels were checked for damage and rolling smoothness. All wheel samples were tested to failure to determine travel life.

Wheel Testing Results

Bishop-Wisecarver®

- 88% of tested wheels met the calculated life
- On average, wheels exceeded calculated life by 120% and failed in a contained mode
- 150% minimum guaranteed distance
 - For more information, see below
- End-of-life is more predictable and contained
 - No fractured components into your machines or process

Top Performing Competitor

- 0% of tested wheels met the calculated life
- On average, wheels only reached 68% of their calculated life and exhibited catastrophic failure
- Top Competitor's minimum guaranteed distance is only 65% of Bishop-Wisecarver®
- End-of-life is earlier than calculated and unpredictable
 - Hazardous catastrophic failures send broken wheels into your machine



Bishop-Wisecarver track sample condition after 215km travel distance.



Top Performing Competitor wheel sample condition at end-of-life failure. Example 1



Top Performing Competitor wheel sample condition at end-of-life failure. Example 2

Laboratory Test of Vee Guide Tracks

Linear guide track testing of competitive products was conducted on stainless steel track using a 4-wheel carriage plate carrying a 560 lb. axial load, at a speed of 0.6 meters per second. The track was frequently measured for wear using a coordinate measuring machine (CMM) to determine the most accurate material loss profile.

Track Testing Results

Stainless steel vee guide track experiences a break-in period immediately after installation, where the track shows a high wear-rate prior to settling in for the remainder of the useful service life. Bishop-Wisecarver® DualVee® track is optimized to minimize the break-in period to provide smoother motion over a longer travel distance, resulting in lower costs during the life of machine.

Bishop-Wisecarver®

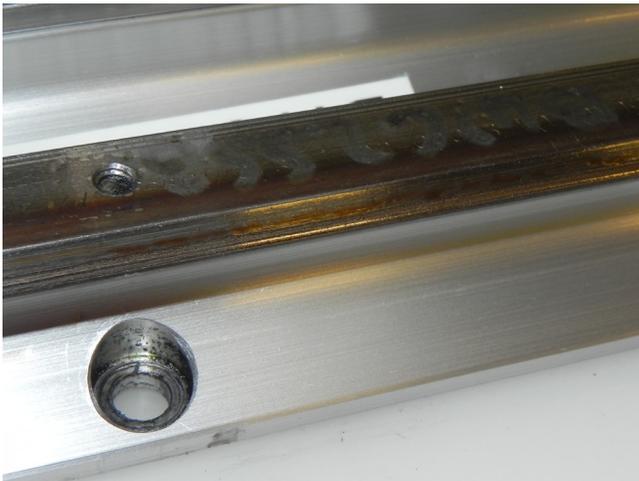
- Rapid break-in period reduces the frequency of preload adjustments
- Low track material wear rate for longer lasting precision motion with fewer adjustments
- 62% less track material loss over the same operating conditions compared to the top performing competitor

Top Performing Competitor

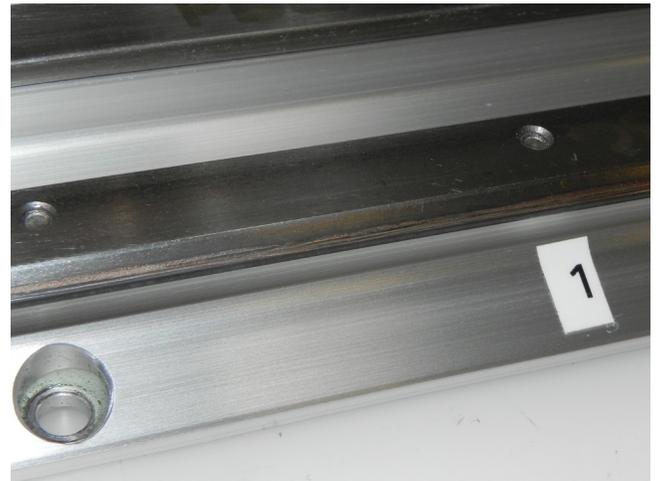
- Longer break-in period with more frequent need for preload adjustments
- More track material wear requires more frequent adjustments
- Rough motion from high track material loss rates

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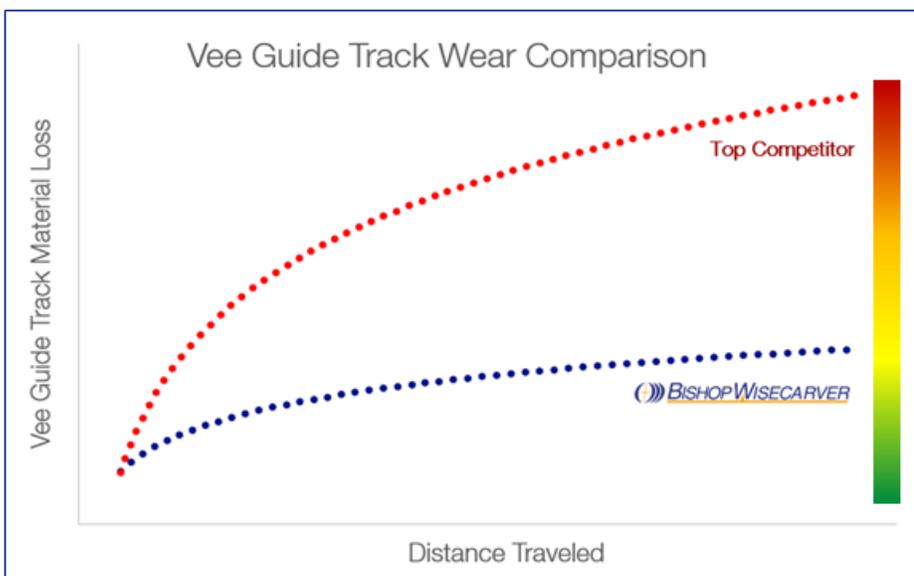
Track Testing Results (cont'd)



Bishop-Wisecarver® track sample condition after 215km travel distance.



Top Performing Competitor track sample condition after 218km travel distance.



Slower wear rate results in:

- Reduced machine downtime
 - Fewer adjustments of the eccentric wheel
- Longer usable service life
- Lower total cost

Evaluating the Results

The prices and specifications of competing guide-wheel based linear motion are often evaluated and compared during the design phase when developing new processing equipment and machinery applications. However, the actual performance of the products in real operating environments should be considered as part of the selection process. Some of the manufacturers' published load capacities and life calculations do not accurately predict the life expectancy when verified by functional testing. Products that cost less money initially but are difficult to assemble, take longer to break-in, require frequent adjustment, have a higher wear rate, or fail prematurely, will increase the total cost of ownership over the long run. Products of higher quality, and durability will provide a lower total cost of ownership over the expected lifespan of the machine.