



GENUINE DUALVEE WHEELS & TRACK OUTPERFORM COPY PRODUCTS

Best in Class Reliability and Less Maintenance = Lower TCO

If you are a design engineer integrating vee guide wheel and track into your machine, your top choice is Bishop-Wisecarver's DualVee Motion Technology®, based on DualVee® guide wheels and track. "Copy" products fail to perform to the same levels as DualVee®, which means these imitator products ultimately increase total cost of ownership (TCO) for your customers in several ways. In addition, using copy products with the expectation of peak performance can, in some instances, pose serious threat of harm to human life and machinery.

This technical white paper presents the results from extensive testing that quantifies the superior performance and reliability of Bishop-Wisecarver's DualVee Motion Technology®.

Test results are presented to outline the various factors that influence TCO — including those related to:

- ✓ Installation and break-in requirements
- ✓ Load capacity and wear
- ✓ Reliability, maintenance, and repair
- ✓ Design support from guided motion component supplier

FIGURE 1: Here, Bishop-Wisecarver's DualVee Motion Technology® maintains world class reliability even when exposed to the wood shavings and dust produced by wood milling and sawing operations.

INTRODUCTION

When designing linear motion into your equipment, a true cost-benefit analysis of all viable options must account for the indirect costs each option is expected to incur during the design process, during installation, and (if applicable) during repair. Questions to ask yourself during the initial stages of design work include:

1. What support can I expect to receive from a given linear-component and systems manufacturer and supplier? Can this potential supplier help to reduce my team's design and manufacturing effort?
2. Are there ways to accelerate the development timeline and start seeing results sooner?
3. If the machines don't perform reliably, how might that reflect on and impact me as the equipment manufacturer?
4. Can my choice in linear-components help trim expenses for our end users over the course of the entire machine life?

After all, the expense of a machine failure includes not just the cost of replacement components, but the labor costs of the maintenance, the value of the operators' time as the machine is down, the lost production capability of the equipment, and potentially the reputation of the equipment manufacturer.

Motion systems that regularly cause machine failure, therefore, end up costing a lot more than just what is on the purchase order.

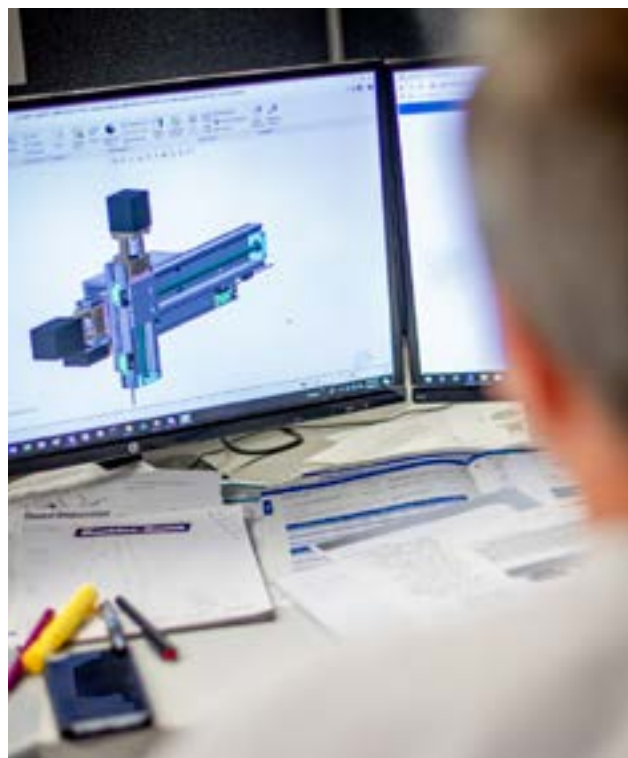


FIGURE 2: Bishop-Wisecarver's DualVee Motion Technology® and Signature Experience make all the difference when it comes to equipment reliability and supplier dependability.

COMPETITOR GUIDE WHEELS FAIL BEFORE DUALVEE®

In the first set of tests, copy vee guide wheels from various competitors were put into the same radial testing machine as genuine DualVee® wheels.

The tests were conducted on stainless-steel vee guide wheels of the same size — each loaded at 325 lbf. radially. Wheels ran at 2 m/s for duty-cycle intervals of 40 minutes. Wheels ran until the predicted travel life using BW calculations, or until failure (whichever first).

The results were clear — **all of the DualVee® wheels exceeded their predicted life**. However, not all of the copy wheels could deliver similarly reliable performance.

In fact, nearly 30% of all sampled competitor wheels showed signs of failure within the first quarter of the testing cycle.

In fact, nearly 30% of all sampled competitor wheels showed signs of failure within the first quarter of the testing cycle.

To further assess the durability of Bishop-Wisecarver's offering vs. copy products, the test was repeated at a higher load (596 lbf. radially) against the closest performing competitor within the previous test.

Both products were run to quantify their **minimum guaranteed travel** values — defined as the distance that 99.8% of wheels from a given product offering are predicted to achieve.

These tests quantified that the minimum guaranteed travel for DualVee® wheels is **more than 01.5 times the distance** of imitation wheels under the same conditions.

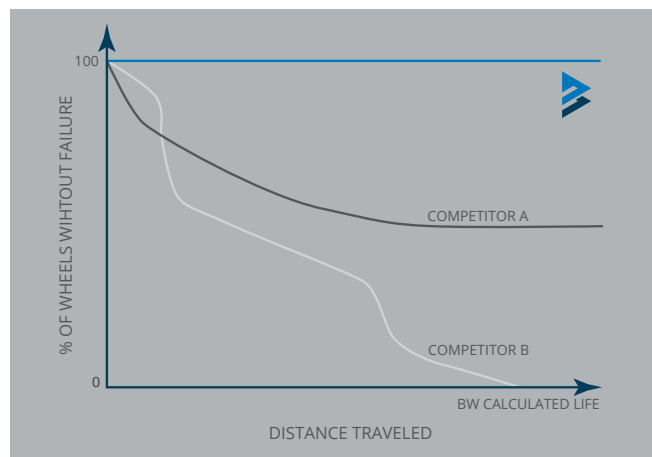


FIGURE 3: When tested under similar loading and duty cycle conditions, copy products from various competitors showed premature failures. Meanwhile, the DualVee® wheels exceeded their calculated life.

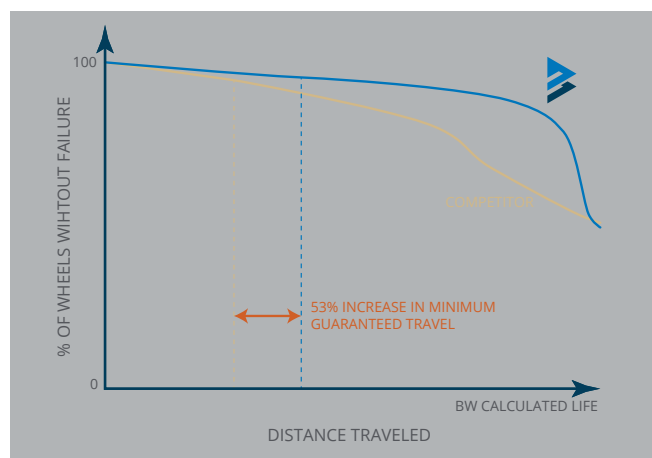


FIGURE 4: Under heavy loading conditions for the given guide wheel size, Bishop-Wisecarver's DualVee® wheels still show higher reliability as they approach the calculated travel life. The higher minimum guaranteed travel life of DualVee® wheels means longer service intervals — and less cost on maintenance over time.

DUALVEE® GUIDE WHEELS DELIVER ON THEIR PUBLISHED LIFE VALUES

The radial testing procedure allows for a comparison between published life values and actual product performance. When designing a guided motion system, these calculations are often used as a starting point for vee wheel sizing and to verify design parameters.

Therefore, calculation procedures and published life values should characterize real-world performance as accurately as possible.

In the high load radial test, life predictions for each sample were made using:

- ✓ Bishop-Wisecarver calculations for DualVee® wheels
- ✓ Competitor calculations for their own wheels

Each life prediction included recommended safety factors for the given load, duty cycle, and equipment conditions.

Competitor Wheels Prematurely Fail

The radial testing revealed that 88% of DualVee® wheels exceeded their predicted life in the high load conditions, and 100% exceeded their predicted life in the lower load conditions.

In contrast, less than 5% of the competitor wheels met their predicted life in the high load conditions, and instead failed before their own calculations would indicate.

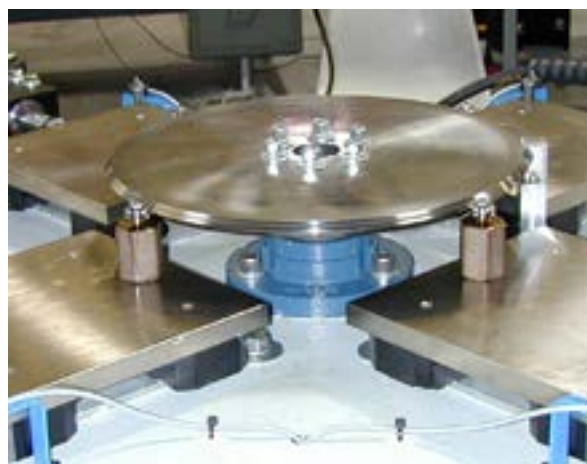


FIGURE 5: Shown here is the radial testing machine used to verify vee guide wheel life.

FEWER FAILURES BOOST QUALITY AND THROUGHPUT

These test results confirm that you as the machine builder can trust DualVee Motion Technology® to meet (and in most cases exceed) service intervals published by Bishop-Wisecarver.

If you're an OEM creating equipment for critical processes or those with high quality standards (such as equipment in the semiconductor, pharmaceutical, or food and beverage industries), it is important to note that **process consistency begins with reliability at the component level** and results in superior quality results.

If you're an OEM building equipment for industries that value high throughput and low machine downtime, motion components that behave predictably can help prevent unscheduled machine shutdown and subsequent revenue losses for customers. For food processing, packaging, electronics, and other industrial equipment, the ability to schedule maintenance to minimize downtime is paramount – and **only possible with reliable motion components**.

COPY WHEELS FAILED CATASTROPHICALLY - DUALVEE® WHEELS DID NOT

In another test, DualVee® and copy competitor wheels were radially loaded with 596 lb and then run until failure. When these imitator wheels failed, they all experienced catastrophic failure of the outer race — throwing metal shards and bearings from the guide wheel.



FIGURE 6: Shown here are two examples of catastrophic failure exhibited by competitor guide wheels. With these components, shards and ball bearings have the potential to fly off and hurt bystanders, damage other machine components, or contaminate material the equipment is responsible for processing.



FIGURE 7: This is a Bishop-Wisecarver guide wheel exhibiting a condition that's typical for this product line's mode of end-of-life failure. No shards or fractures are present — and the component is essentially intact.

In contrast, when Bishop-Wisecarver's DualVee® wheels eventually failed (after traveling on average 30% farther than the failed copy wheels), they remained safely contained and did not experience catastrophic failure.

CONTAINED FAILURES PROTECT LIFE AND PROPERTY

These test results confirm that you as the machine builder can trust DualVee Motion Technology® to remain intact — even in the unlikely event of catastrophic failure. The contained failure of DualVee® wheels minimizes the risk to nearby operators. It also reduces the chance that nearby equipment will be damaged, or that the results of equipment processing will be contaminated.

If you're an OEM, this predictable performance helps your customers avoid the dangerous contamination of food, electronics, or other products by metal shards. Additionally, the effects of downtime are minimized by only having to replace intact wheels instead of potentially spending time hunting for shards or repairing other machine elements damaged by a catastrophic failure.

DUALVEE® TRACKS EXHIBIT SUPERIOR WEAR PROPERTIES

A third round of testing subjected DualVee® and competitor vee-profiled tracks to normal operating conditions. This testing was conducted on sections of hardened stainless-steel vee guide track using a four-wheel plate carrying a 560 lb axial load at a speed of 0.6 m/s. Each cycle was 1 m of travel. The tracks were frequently measured for wear using a coordinate measuring machine (CMM) to determine the most accurate material loss profile.

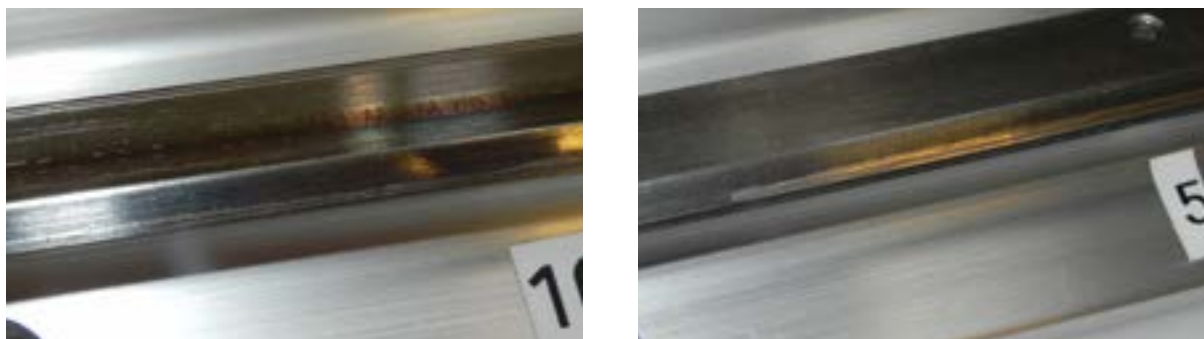


FIGURE 8: Every track shows some wear over repeated cycles, but Bishop-Wisecarver track sheds less material over its working life and takes less time to break in when compared with competitor track. This image shows BW track (left) and competitor track (right) after being ridden 218 km by four steel wheels bearing a 580 lb load.

DualVee® track showed a shorter break-in period and slower wear rate than competitor track. More specifically, DualVee® track showed 49% less material loss over these operating conditions than competitor track.

VALUE TO YOUR END USER: REDUCE MAINTENANCE

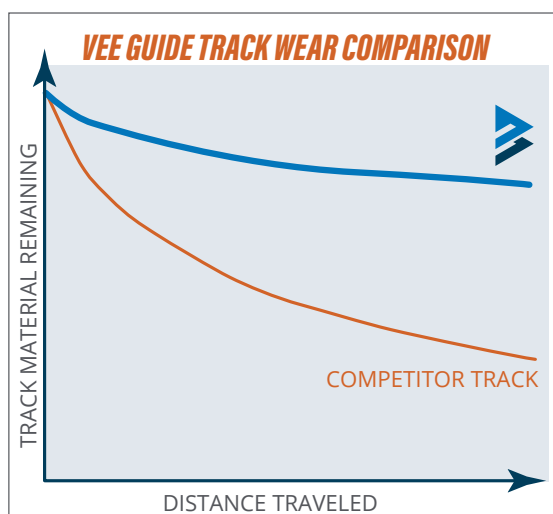


FIGURE 9: The prices and basic specifications of vee-based linear motion options for new processing equipment and machinery are often evaluated during early design phases. However, actual product performance under real operating environments — including that of the track — should be considered during the selection process.

The shorter break-in period and slower wear rate of DualVee® track makes for smoother motion and a longer service life than that of the copy products. In addition, a rapid break-in period reduces the frequency of preload adjustments required over the life of the component and makes for motion with consistently higher precision.

The more the track material wears down, the more the distance between the wheel mounting point and track mounting point decreases. This change lowers precision over time. Furthermore, any loosening within the system can exacerbate the precision losses and life-shortening effects of vibration. DualVee® track loses less material after its break in period than competitor track, minimizing these influences.

SUPERIOR PRODUCTS AND SERVICE MAKE BISHOP-WISECARVER YOUR TRUSTED SUPPLY-CHAIN PARTNER

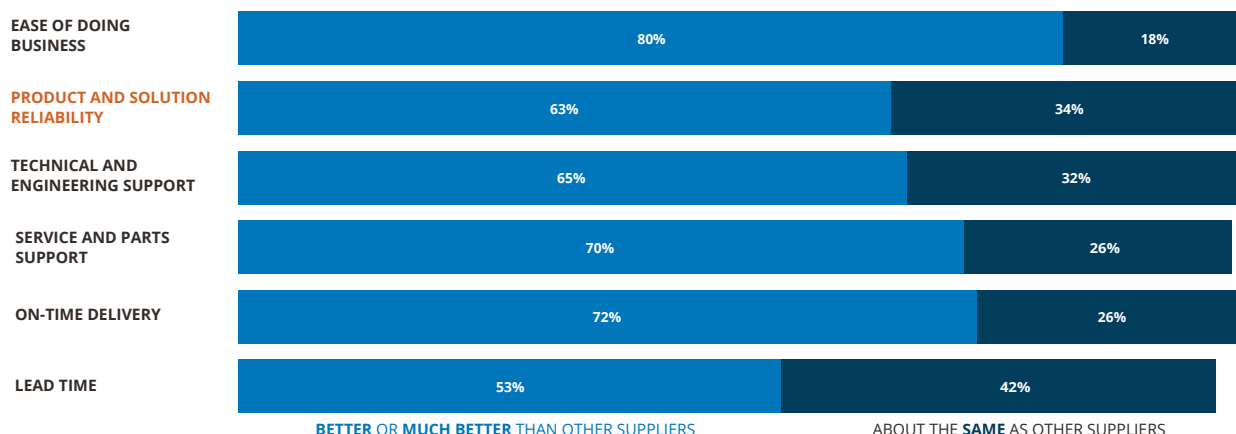
Vee guide solutions can simplify designs and ease installation. However, as we've illustrated in this white paper, not all vee guides are created equal. Compared to DualVee Motion Technology®, other guided motion solutions:

- ✓ Take longer to break in
- ✓ Require more frequent adjustment to compensate for a higher wear rate
- ✓ Fail unpredictably and catastrophically — and cannot be guaranteed to last as long
- ✓ Have the potential for cascading damage or human injury upon failure

Together, these competitor-product limitations hinder machine reliability and increase the total cost of ownership over the lifespan of the machine.

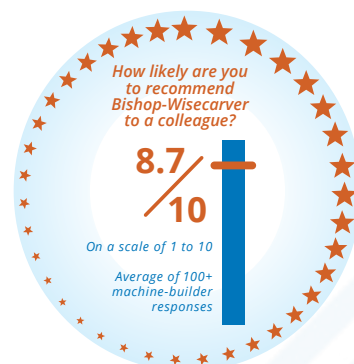
DualVee Motion Technology® is expertly designed and delivered to perform. In addition, Bishop-Wisecarver's product offering is complemented by world-class customer service that makes it easier than ever to implement reliable motion solutions that fit your needs. Over the last decade, when customers were asked how Bishop-Wisecarver compares to other suppliers, these machine builders made it clear that Bishop-Wisecarver is ahead of the curve:

BISHOP-WISECARVER IS A TRUSTED SUPPLY-CHAIN PARTNER



When engaging with Bishop-Wisecarver, customers can expect a Signature Experience — which Bishop-Wisecarver defines as one that includes:

- ✓ Prompt customer service — Our renowned customer service team provides helpful and proactive communication from ideation to completion
- ✓ Technical collaboration — Expert guidance on customized solution development and product selection ensures the right design for your problem, providing documentation, design assumptions, and solution requirements
- ✓ Exceptional lead times — Keep your project on time and on budget



HOW TO SPECIFY BISHOP-WISECARVER DUALVEE® PRODUCTS IN YOUR CURRENT DESIGN

The first step in specifying Bishop-Wisecarver DualVee® components into your equipment is to gather all required design parameters. Our catalog provides a reference on how to quantify some of those values ⇨

Then reach out to our team at sales@bwc.com or (925) 439-8272 (or visit bwc.com/sales-contacts) for engineering support and details on your options.



WATCH DUALVEE MOTION TECHNOLOGY® IN OPERATION

Check out the Bishop-Wisecarver video library at youtube.com/BishopWisecarver for footage of DualVee Motion Technology® in operation.

[WATCH NOW](#)

ABOUT

Bishop-Wisecarver develops innovative motion solutions that are expertly designed and delivered to perform from a company you can trust. Leveraging over 70 years of experience, we've earned the reputation of providing unmatched quality, reliable service and engineering support for every stage of a customer's design cycle. No matter your application, volume shipment requirements or extreme environmental conditions, Bishop-Wisecarver listens to your specific needs and delivers innovative solutions.

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