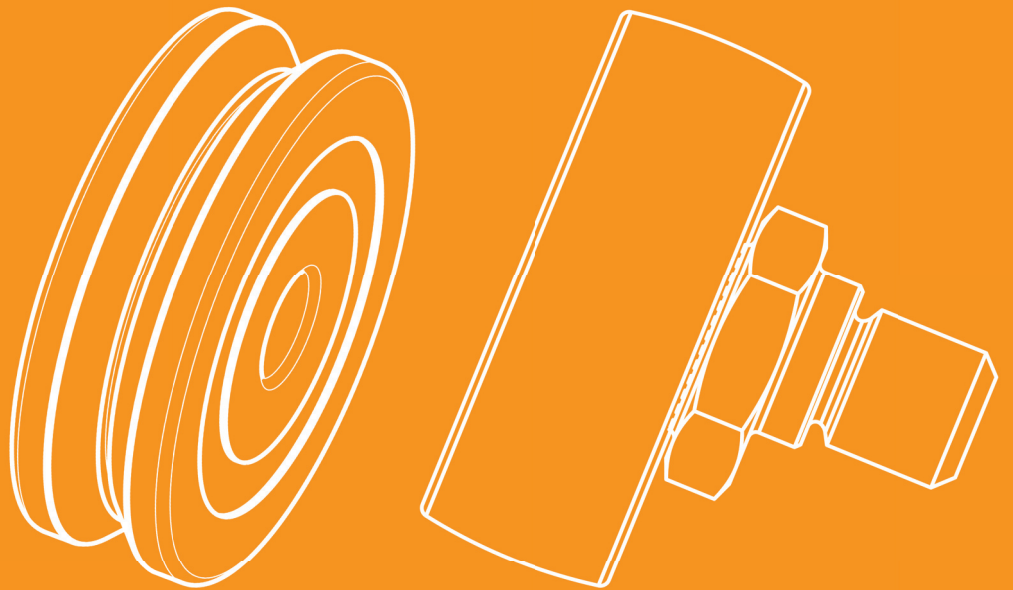
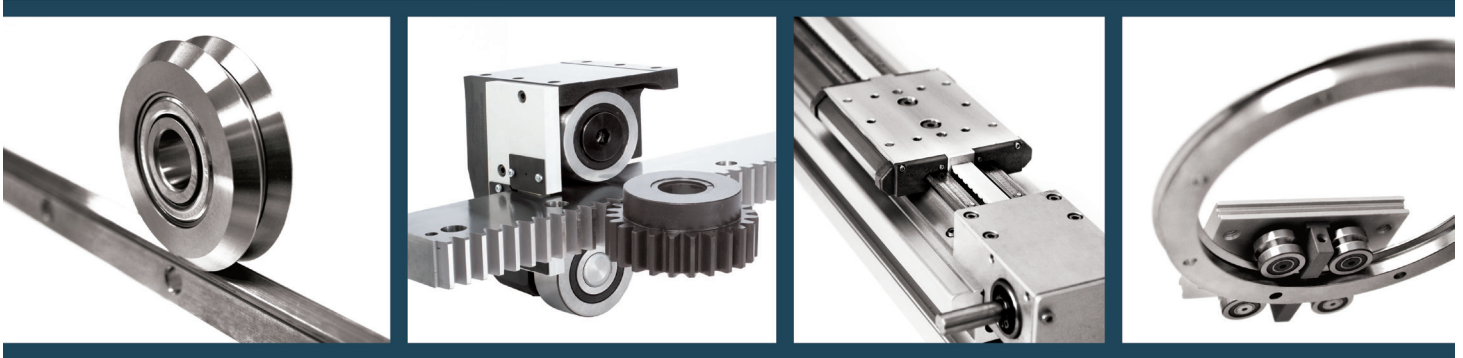


MadeWell®





MADEWELL® — QUALITY, RELIABILITY AND DURABILITY

This product line represents simple solutions for complex problems. MadeWell takes us back to our roots of solving everyday challenges for industries such as architecture, transportation, semiconductor, electronics, engineering services and many others. This collection leverages our patented technologies, helping us better develop engineering breakthroughs. MadeWell products use the latest engineering technology to deliver reliable, simple answers to specific applications.

HOW OUR CAPABILITIES MATCH YOUR DESIGN NEEDS

For more than sixty years, Bishop-Wisecarver has created innovative solutions for tough mechanical engineering challenges for a variety of industries. We continue to make high quality products tailored to each customer's needs that provide durability, long life and reliable functionality for the most creative of designs.

Customers like us because our collection of linear and curvilinear motion technologies provide them with product differentiation and customizable solutions to fit virtually any environment. From dirty and corrosive conditions to cleanroom and washdown settings, our products come in many sizes, lengths, material types and customizations no matter how few or many you order.

Whether you need straight, back and forth motion or a curved track solution with custom bends and turns, we have the technologies and resources to fit your needs to a vee. Motion without limits.

WHAT MAKES US DIFFERENT

Our engineering and manufacturing facility provides expert development support and quick turnaround time. We tackle all engineering challenges with a novel approach — we have the patents to prove it and are majority sourced USA. We offer custom engineering services and technical expertise in motion, sensor and actuator integration, real-time software development, and electromechanical modeling and design.

As the original inventor the DualVee Motion Technology®, we offer a high quality v-bearing guide wheel technology that is excellent for high speed, smooth motion, low noise and long lengths. DualVee® comes with four guide wheel options: original v-bearing wheels, studded v-bearing wheels, patented integral v-bearing wheels and patented washdown wheels.

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Bishop-Wisecarver is a certified woman-owned manufacturer in its second generation, and has remained one of the most respected names in custom automation solutions and guided motion technology since 1950.

The San Francisco Bay Area company manufactures, stocks, and distributes components and systems for linear, rotary and curved track applications globally, and has been the exclusive North and Central American Partner and Distributor for HepcoMotion® products since 1984.

Our desire to be your number one choice is what drives us to continually develop our industry knowledge, services and imagination — whether it is an off-the-shelf product or a custom solution, we fit you to a vee.

Product Offerings:

Linear Components & Accessories
Manual Linear Guides
Actuated Linear Guides
Complete XYZ Systems
Rotary Components & Accessories
Rings & Curved Track Segments
Rotary Guide Systems
Custom Solutions

SOLVED DESIGN CHALLENGES

Application Examples Using Radial Wheels and Crown Rollers

Radial wheels and crown rollers can operate in various environments, whether in finished products such as motorized windows and doors, or in the production and assembly equipment employed to produce those finished products. From moving wall panels in the architectural industry to machine guards in the industrial space, the MadeWell product offering provides a variety of possibilities. Below are a few examples of how these linear guide wheels have been used.

Doors and Windows Set in Motion with Ease

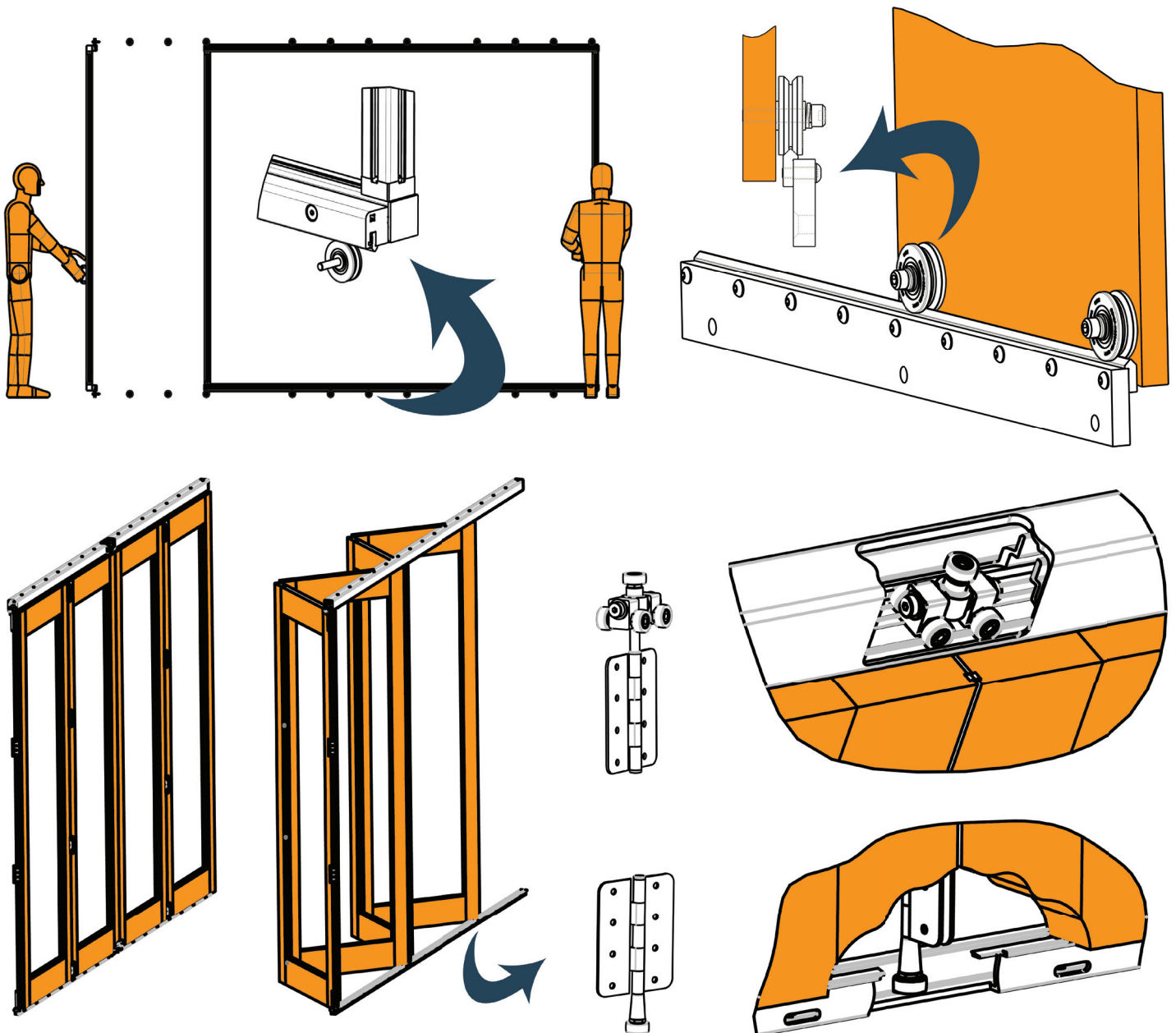
Tasked with designing a luxury home with custom large moving windows and doors, this architect needed a reliable compact linear guide system that provided smooth, quiet motion for heavy loads over long lengths for years to come.

Museum Displays, Cabinets and Doors that Move with Your Imagination

This team needed to put displays, cabinets and doors in motion for a large museum installation. The design required heavy duty linear guides that could move smoothly and quietly over long lengths with an easy-to-use functionality for curators.

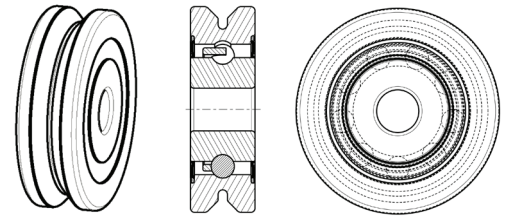
Debris is No Match for Moving Machine Tool Doors

Since metal shavings and cutting fluids are everywhere during production, this manufacturer of industrial machine tools needed a vee-shaped wheel and track to get their doors rolling smoothly without jamming. The solution also needed to fit their tight budget.



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RADIAL WHEELS



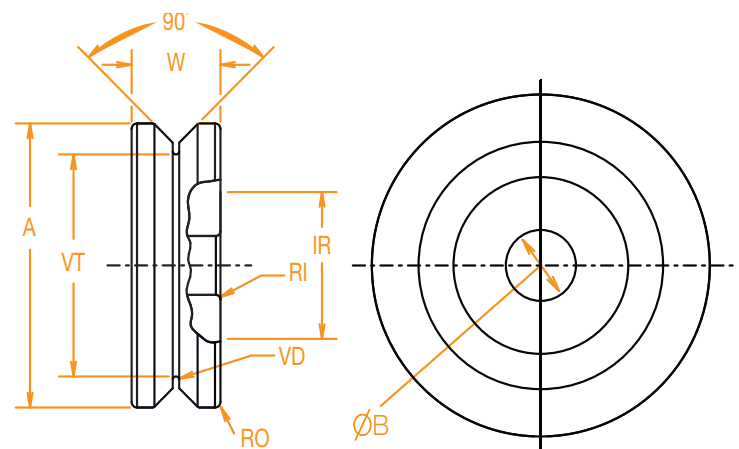
SPECIFICATIONS AND KEY FEATURES:

- Carbon steel and stainless steel versions are available in three sizes (1, 2, 3)
- Materials used include high carbon tool steel (AISI 52100), high carbon martensitic stainless steel (AISI 440 C), Nylon with fiberglass fill 25% (PA66 GF25) and nitrile butadiene rubber (NBR)
- Concentric mounting options only, designed to run on matching 90° vee edge track
- Can be assembled with standard screws and simple inner race spacers
 - Size-1 recommended hardware: M5 Screws, M5 DIN 433 washers for mounting spacers
 - Size-2 recommended hardware: 1/4" Screws, SAE type A 1/4" washers for mounting spacers
 - Size-3 recommended hardware: M8 or 5/16" screws, M8 DIN 125 or SAE type A 5/16" washer for mounting spacers
- Recommended maximum operating speed is 5.5 m/s
- Recommended operating temperature range: -20°C to +100°C

Size	Stock Code	Outside Diameter ØA (+/- .005")	Bore Size ØB (+/- .002")	Wheel Width W (+/- .002")	Vee Relief Tangent ØVT (+/- .005")	Inner Race Diameter ØIR (+/- .005")	Inner Radius RI	Outer Radius RO	Vee Relief Diameter ØVD	Weight Grams (g)
1	W1RX	0.771	0.201	0.274	0.586	0.358	0.012	0.016	0.039	10
	W1RSSX									
2	W2RX	1.210	0.251	0.383	0.944	0.625	0.020	0.024	0.055	38
	W2RSSX									
3	W3RX	1.803	0.316	0.551	1.421	0.854	0.024	0.024	0.079	122
	W3RSSX									

Load Rating	W1RX W1RSSX	W2RX W2RSSX	W3RX W3RSSX
Radial (N)	670	1500	3700
Axial (N)	138	320	800
Radial (lbf)	151	337	832
Axial (lbf)	31	72	180

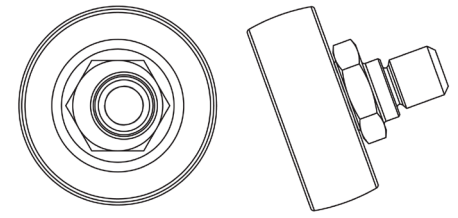
Single Row	W1RX W2RX W3RX	W1RSSX W2RSSX W3RSSX
Race and Ball Material	AISI 52100	AISI 440 C
Cage Material	PA66 GF25	
Seal Material	NBR + AISI 304	



*Based on theoretical results, not actual.
*All values are in inches.

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CROWN ROLLERS

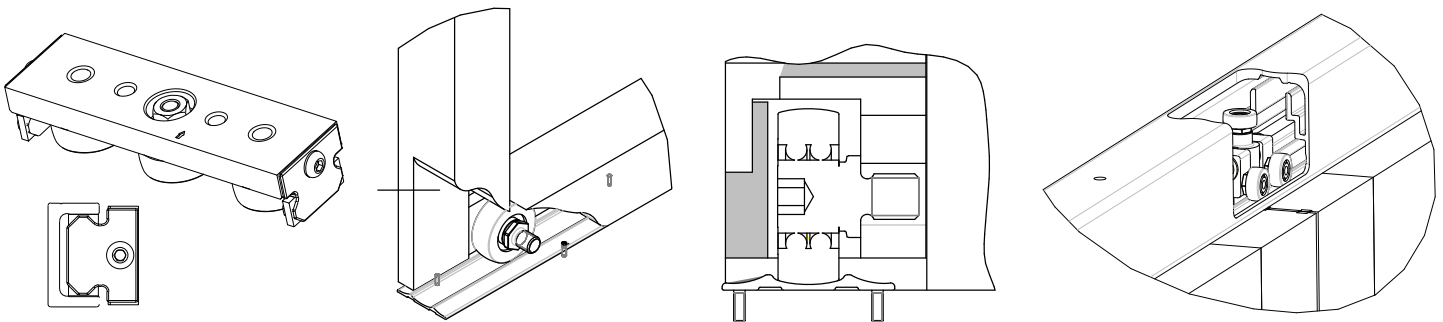


SPECIFICATIONS AND KEY FEATURES:

- Carbon steel and polymer versions are available in four sizes (0, 1, 2, 3)
 - 52100 carbon steel, ground, double row, angular contact bearing arrangement, available sealed or shielded, internal lubrication
 - High temperature polymer overmould of a stainless steel single-row bearing arrangement
- Threaded mounting stud is integrated into inner race
- Designed to run on flat surfaces
- Open channel track optimized for usage with crown rollers are available
 - Available in 6063-T6 aluminum alloy channel for polymer crown rollers
 - Available in carbon bearing steel with hardened steel raceways for steel crown rollers
- Concentric and eccentric versions are available

MadeWell Crown Rollers can be used in conjunction with DualVee® Guide Wheels for applications requiring pairs of linear guide systems operating in parallel. Such arrangements are used when wide spans or high moment loads need to be supported. One slide uses DualVee Guide Wheels with vee channel track and the other uses MadeWell Crown Rollers with open channel track. Working in unison, the vee side serves as the primary guide while the roller side provides radial support to compensate for parallel misalignment. Because precise parallelism between paired guides is difficult to achieve, the usage of MadeWell Crown Rollers on one side instead of both sides using DualVee Guide Wheels compensates for mounting errors. To learn more about this solution, review the UtiliTrak® product catalog.

MOUNTING EXAMPLES



Studded Wheel Integral	Wheel Offset	Wheel Size (Diameter)	Materials Code	Outer Race	Inner Race	Ball	Retainer	Shield or Seal
CSWI	C = Concentric E = Eccentric	0 = 14.83mm .584in	Blank (Std.)* =	52100	52100	52100	PA66 GF25	Shield
		1 = 19.58mm .771in	X* =	52100	52100	52100	PA66 GF25	Seal
		2 = 30.73mm 1.210in 3 = 45.80mm 1.803in	P** =	Polymer Overmoulded 440C	440C	440C	300 Series Stainless Steel	Shield

*Not available in size-0

**Not available in size-3

Crown Roller Load Capacity

Part Number	Radial Load (N)	Radial Load (lbf)	Weight Grams (C)	Weight Grams (E)
CSWIC1/CSWIE1 Steel	1220	274	25.0	25.0
CSWIC2/CSWIE2 Steel	2650	596	65.0	65.0
CSWIC3/CSWIE3 Steel	5900	1326	190.0	190.0
CSWIC0P/CSWIE0P Polymer	28	6	6.2	6.0
CSWIC1P/CSWIE1P Polymer	55	12	11.2	10.2
CSWIC2P/CSWIE2P Polymer	70	16	27.5	26.2

*Based on theoretical results, not actual.

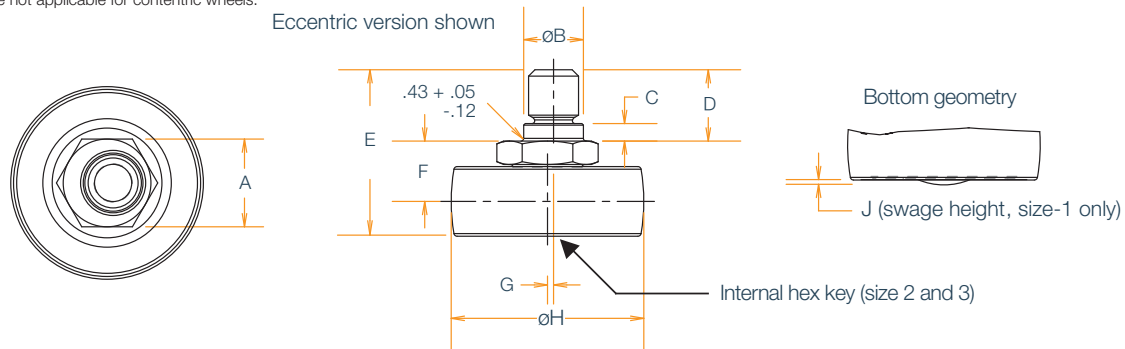
* lbf = pounds of force

Integral Studded Crown Rollers, Steel

Size	A	B ¹	C ²	D ³	E	F ⁴	G	Concentric Stud Thread	Eccentric Stud Thread	H	Internal Hex (steel version only)	J (max)
1	12	6.30	2.16	8.10	19.34	7.30	0.61	M8 x 1.25	M6 x 1.0	19.58	-	0.5
2	14	9.53	2.79	11.38	26.57	9.63	0.76	M10 x 1.5	M8 x 1.25	30.73	6	-
3	19	10.80	4.32	15.10	36.64	13.63	1.50	M12 x 1.75	M10 x 1.5	45.80	8	-

* Values are in millimeters.

* Dimensions B, C and G are not applicable for concentric wheels.

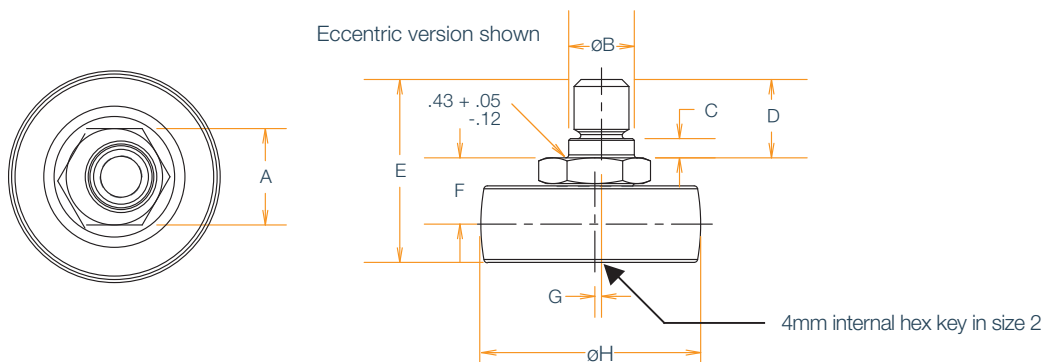


Integral Studded Crown Rollers, Polymer

Size	A	B ¹	C ²	D ³	E	F ⁴	G	Concentric Stud Thread	Eccentric Stud Thread	H
0	11	5.56	2.16	7.62	16.94	6.15	0.81	M6 x 1.0	M5 x 0.8	14.83
1	12	6.30	2.16	8.10	19.34	7.30	0.84	M8 x 1.25	M6 x 1.0	19.58
2	14	9.53	2.79	11.38	26.56	9.63	0.97	M10 x 1.5	M8 x 1.25	30.73

* Values are in millimeters.

* Dimensions B, C and G are not applicable for concentric wheels.



Notes

1. Diameter tolerance is +0.05/-0.00
2. Height tolerance is +/-0.13
3. Height tolerance is +/-0.1
4. Height tolerance is +/-0.05

Load/Life Relationship, Equation and Sizing/Selection

Several factors influence the service life of a linear guide wheel. Through research and development, Bishop-Wisecarver has devised a simple method to estimate the load/life relationship for a specific MadeWell guide mechanism under defined loading conditions. The methodology accounts for the size of the bearing elements and the load orientation and magnitude. The equation is based upon clean and well lubricated track conditions; so for applications where lubrication is prohibitive, a derating factor must be applied.

It is important to note that secondary considerations such as maximum velocity, acceleration rates, duty cycle, stroke length, environmental conditions, the presence of shock and vibration, and extreme temperature ranges can all impact service life to varying degrees. As such, the sizing method is considered only as a guideline for the sizing of MadeWell components.

The load/life estimation requires a basic understanding of the principles of statics, the ability to work with free body diagrams, and the capacity to resolve externally applied forces on a MadeWell based carriage assembly into the radial and axial reaction forces at each guide wheel in the design. The life of a MadeWell based carriage assembly will be limited to the life of the most heavily loaded wheel in the design.

Step 1: Calculate the resultant radial and axial loads reflected to each bearing element in the linear guide design.

All standard considerations involved in statics calculations must be accounted for, including inertial forces, gravitational forces, external forces such as tool pressure, bearing element spacing, and magnitude and direction of the payload. Any external forces that generate a reaction through the wheel/track interface need to be considered. If assistance is required in resolving specific loads into the resultant reaction forces at the guide wheel interface, contact our Applications Engineering staff for support. It is recommended that an application data sheet, which can be found in the DualVee catalog or on the Bishop-Wisecarver website, be submitted beforehand with as much application information detailed as possible.

Step 2: Calculate the load factor for the most heavily loaded bearing.

$$L_F = \frac{F_A}{F_{A(max)}} + \frac{F_R}{F_{R(max)}}$$

Bearings should be sized such that $L_F \leq 1$

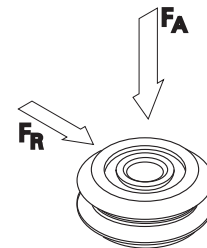
The most heavily loaded bearing will have the highest load factor

Step 3: Calculate life by applying the load factor to the load/life equation below.

Due to varying application load and speed parameters and environmental conditions, the appropriate adjustment factor (A_F) must be applied to the life equation.

A_F	Application Conditions
1.0-0.7	Clean, low speed, low shock, low duty
0.7-0.4	Moderate contaminants, medium duty, medium shock, low to medium vibration, moderate speed
0.4-0.1	Heavy contamination, high acceleration, high speed, medium to high shock, high vibration, high duty cycle

Where L_F = Load Factor
 F_A = Resultant axial load on the guide wheel
 $F_{A(max)}$ = Maximum axial working load capacity of guide wheel
 F_R = Resultant radial load on the guide wheel
 $F_{R(max)}$ = Maximum radial working load capacity of guide wheel



$$\text{Life} = \left(\frac{L_c}{(L_F)^3} \right) A_F$$

Where L_F = Load Factor
 L_c = Life Constant
 A_F = Adjustment Factor

Size	Life Constant L	
	Inches of Travel Life	Kilometers of Travel Life
0	1.65×10^6	41
1	2.19×10^6	55
2	3.47×10^6	87
3	5.19×10^6	130

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BISHOPWISECARVER®

Bishop-Wisecarver is a WBENC certified woman-owned manufacturer of the original DualVee® guide wheel and industry leader in linear and curvilinear motion solutions. Exclusive North and Central American partner and distributor for HepcoMotion products since 1984.

BishopWisecarver®

DualVee® Guide Wheels
LoPro® Linear Motion System
MadeWell® Crown Rollers
MadeWell® Radial Wheels
MinVee® Linear Slide System
UtiliTrak® Linear Motion Guide
UTCSK Camera Slider Kit

HepcoMotion®

ALR Aluminum Rings
DAPDU2 Double Acting Profile Driven Unit
DLS Driven Linear System
DTS2 Driven Track System
GV3 Linear Guidance and Transmission System
HDCB Heavy Duty Compact Beam
HDCS Heavy Duty Compact Screw
HDLS Heavy Duty Driven Linear System
HDRT Heavy Duty Ring Slides and Track System
HDS2 Heavy Duty Slide System
MHD Heavy Duty Track Roller Guidance System
MCS Machine Construction System
PDU2 Profile Driven Unit
PDU2M Belt Driven Unit
PRT2 Precision Ring and Track System
PSD80 Screw Driven Linear Actuator
PSD120 Profile Screw Driven Unit
SBD Sealed Belt Drive
Simple-Select®
SL2 Stainless Steel Based Slide System

3D CAD DRAWINGS

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