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CONVEYOR POLY-V BELT FACT SHEET

Selection Considerations

1.9 Inch and 2.5 Inch Rollers

Provided as a service to the Conveyor Industry by
CEMA Unit Handling Conveyor Section

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Conveyor systems today offer several drive systems to transmit torque from roller to roller. A relatively new approach was introduced several years back using Poly-V belts that are stretchy belts assembled on specific hubs attached at each end of a roller. Poly-V belt driven conveyor rollers offer an alternative to Chain Driven rollers and O-Ring driven rollers. These rollers can be driven by a motorized drive roller, pancake motor attached to the side of the rail or by using the line shaft method. The power between the drive and the rollers is transferred by the Poly-V belts. The fact sheet below will cover the 1.9 inch roller as well as the 2.5 inch roller and give the user some design parameters to be used in the selection of the drive and the belt sizes.

Motorized Drive Rollers (MDR) applications with Poly-V Belts

The typical conveyor application of Motorized Drive Rollers (MDR) involves using an individual motor to power shorter conveyor sections (i.e. conveyor "zone"). An individual zone sensor is also applied one per zone, allowing for some type of logic controller to determine the presence or absence of articles on the conveyor. In turn, the controller only operates the zones as necessary to move the articles being transported.

By far, the greatest number of conveyor applications for MDR involve roller conveyor. It is most cost effective to transfer power from the motorized rollers to the idler rollers that form the zone extending the "powered" rollers beyond the individual MDR. Earlier designs used urethane bands (similar to those found in line shaft applications) to serve this purpose. However as product weights and speeds increased, a different type of drive was required to prevent slipping and reduced belt life. The Poly-V Belt is now being applied to meet these requirements however, there are certain design considerations to keep in mind to insure the correct conveyor operation:

1. **Speed**

   Because of the increased tension of the Poly-V Belt when compared to typical O Ring designs, the no-load and light product load speeds will be slower than expected. This speed difference will balance out as the article weight approaches the MDR rated load specification.

   Since the MDR is in contact with the article that is being transferred at regular intervals during the transportation, certain speed differences can be overcome based on the relationship between product size and zone length.

2. **Amperage**

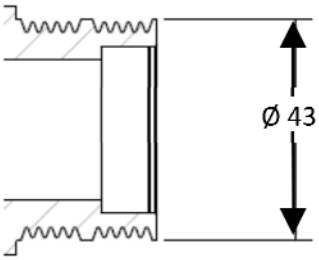
The positive drive of the Poly-V Belt requires additional torque when compared to O-Rings. No- load amperage can approach rated amperage, even without product on the conveyor. While the amperage compared to O-Ring driven rollers balances out as the load approaches rated capacity, this additional amp draw should be taken into consideration when sizing the power supplies.

The amounts of applications for the Poly-V Belt have been increasing recently, and are expected to continue for the future. Usage of the belt has provided additional applications in environments that were difficult or impossible with O-Rings, such as in the presence of chemicals or low temperatures. Sizing the proper MDR to meet the application requirements is necessary to maximize the potential ROI.

1.9 inch rollers:

There is no standard as of this writing for the hub diameter used on the 1.9 inch end hub. Several manufacturers have accepted the dimension of 43 mm which uses the "J" profile found in the ISO standard 9982. These hubs are either injection molded thermoplastics, machined from PA66 material, or metals such as carbon steel, stainless steel or aluminum. Hub inserts with the Poly-V configurations are manufactured with one or two precision ball bearings depending on the manufacturer. The number of belt ribs required is dependent on the amount of torque that you need to transmit and the speed that is required for your application. Hub manufacturers normally provide 8 to 10 grooves on these hubs. The hubs are normally pressed in or swaged into the roller tubes to secured to the inside diameter of the steel roller.

An example of such a hub is dimensioned below:



Design criteria for the parts are based on the belt configuration which is determined from the following information:

1. Length of a zone in the conveyor.
2. Maximum load and footprint of load to be conveyed in a zone.

3. Maximum load per roller.
4. Maximum load in the zone.
5. Speed of the conveyor.
6. Diameter of the roller tube.
7. O.D. of the insert or ring.
8. Special environmental conditions.

From this information the manufacturer of the Poly-V belts will determine what series belt configuration and how many ribs will be required. When that information is given to the roller manufacturer they will then produce a roller with the appropriate insert or ring.

Shaft options include spring loaded, fixed or drilled and tapped and a choice of materials including hex or round configurations.

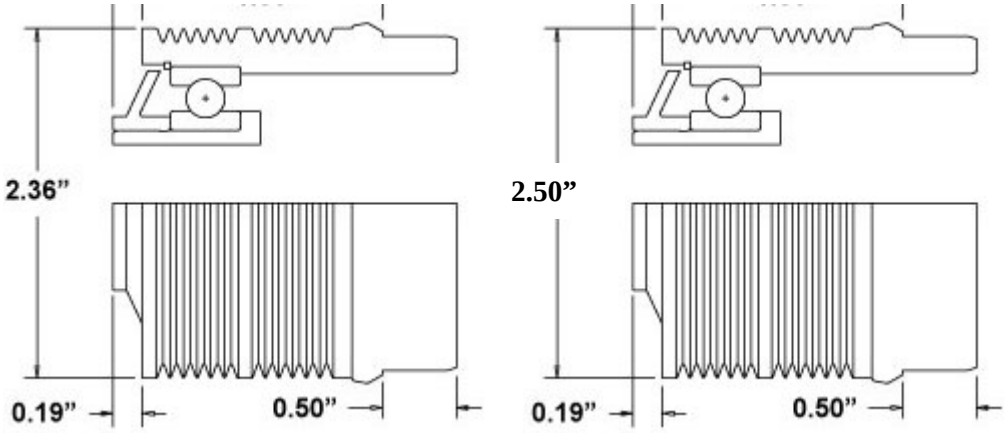
Center distances between rollers can vary so the chart below will give you a quick summary of which belt you must use depending on the center distance selected. This sounds easy, yet you must decide the number of ribs required for the belt and that is based on the load you are transporting and the desired speed. By using the chart below you will be able to select the proper belt for the application.

Roller Diameter (in)	Pulley Diameter (mm)	Center Distance (in)	ConveyXonic Belt size	Tension / Rib (N)	Max Torque (Nm)					Max Load (Lb)				
					Rib count					Rib count				
					2	3	4	5	6	2	3	4	5	6
1.9	43	2	236	30.4	1.31	1.96	2.61	3.27	3.92	454	681	908	1135	1362
1.9	43	2.25	246	31.1	1.34	2.01	2.67	3.34	4.01	464	697	929	1161	1393
1.9	43	2.5	263	30.3	1.30	1.95	2.61	3.26	3.91	452	679	905	1131	1357
1.9	43	2.75	270	33.3	1.43	2.15	2.86	3.58	4.30	497	746	995	1243	1492
1.9	43	3	286	33.7	1.45	2.17	2.90	3.62	4.35	503	755	1007	1258	1510
1.9	43	3.25	302	21.9	0.94	1.41	1.88	2.35	2.83	327	491	654	818	981
1.9	43	3.5	314	21.1	0.91	1.36	1.81	2.27	2.72	315	473	630	788	945
1.9	43	4	336	29.5	1.27	1.90	2.54	3.17	3.81	441	661	881	1101	1322
1.9	43	4.25	348	30.1	1.29	1.94	2.59	3.24	3.88	449	674	899	1124	1348
1.9	43	4.5		30.2	1.30	1.95	2.60	3.25	3.90	451	676	902	1127	1353
1.9	43	4.75	376	26.1	1.12	1.68	2.24	2.81	3.37	390	585	780	974	1169
1.9	43	5												
1.9	43	5.25	402	25.9	1.11	1.67	2.23	2.78	3.34	387	580	774	967	1160
1.9	43	5.5												
1.9	43	5.75	427	23.9	1.03	1.54	2.06	2.57	3.08	357	535	714	892	1071
1.9	43	6	435	33.2	1.43	2.14	2.86	3.57	4.28	496	744	992	1239	1487
								Average Load		425.4	638.1	850.7	1063	1276

2.5 inch rollers:

Since there are no standards as to the hub diameters for this size hub, several manufacturers have established 60 mm or 63.5 mm for the outside diameter. The construction of these types of hubs is machined steel since these hubs are welded to the 2.5 inch diameter tubing. You

then must decide whether to use a "J" or "K" profile to drive your conveyor. The "J" profile requires a wider belt per the load, which means it will take extra ribs to drive the same load as a narrower "K" profile belt. The benefits of using the "J" are its low profile. By using a "J" profile the belt height when installed is the same overall diameter as the 2.5 inch tube when using the 60 mm hub.



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Roller Diameter (in)	Pulley Diameter (mm)	Center Distance (in)	ConveyXonic Belt size	Tension / Rib (N)	Max Torque (Nm)					Max Load (Lb)				
					Rib count					Rib count				
					2	3	4	5	6	2	3	4	5	6
2.5	60	3	336	25.8	1.51	2.26	3.02	3.77	4.53	385	578	771	963	1156
2.5	60	4												
2.5	60	4.5	416	31.7	1.85	2.78	3.71	4.64	5.56	473	710	947	1183	1420
2.5	60	6	486	31.5	1.84	2.76	3.69	4.61	5.53	470	706	941	1176	1411
2.5	60	9												
2.5	60	12												
							Average Load			443	664.5	886	1108	1329
					Rib count					Rib count				
					2	3	4	5	6	2	3	4	5	6
2.5	63.5	3	352	32.1	2.04	3.06	4.08	5.10	6.12	479	719	959	1198	1438
2.5	63.5	4		27.4	1.74	2.61	3.48	4.35	5.22	409	614	818	1023	1228
2.5	63.5	4.5	435	25.2	1.60	2.40	3.20	4.00	4.80	376	564	753	941	1129
2.5	63.5	6												
2.5	63.5	9	636	35.3	2.24	3.36	4.48	5.60	6.72	527	791	1054	1318	1581
2.5	63.5	12	809	30	1.91	2.86	3.81	4.76	5.72	448	672	896	1120	1344
							Average Load			448	672	896	1120	1344

Advantages and considerations of using Poly-V belt driven rollers versus O-Ring driven rollers:

- More power transferred from roller to roller versus polyurethane O-Rings
- Less belt slippage from Poly-V belts
- One drive powers more slave rollers depending on application
- Robotic picking due to more precise stopping and starting
- Longer life belts compared to TPU
- No maintenance on the Poly-V belt once it is installed

Considerations for Poly-V belt driven rollers versus Chain driven rollers:

- Closer roller centers than sprocket driven rollers
- Conveyor can be lower to the ground if motorized rollers are incorporated
- No lubrication required with Poly-V rollers
- Robotic picking due to more precise and stopping
- Elimination of gear boxes
- Noise

Safety concern:

Poly-V belts have very little elongation of stretch. Guards or shields should be installed anywhere personnel or property could come in contact with the rollers.

Overall: Lower cost of ownership.

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