METAL VS PLASTIC

HOW TO DECIDE BETWEEN METAL AND PLASTIC BELTS

Metal belts from Ashworth provide our customers with a stronger, more resilient, and longer-lasting conveyor solution compared to plastic belts that are characterized by inconsistent collapse factors, minimal support options, and limitations related to achieving desired product temperature in cooling and freezing applications. Under typical operating conditions, in terms of mechanical reliability and overall strength, Ashworth metal belts are significantly less likely to incur damage compared to plastic-based belt systems.

Ashworth offers a broad range of metal belt designs for a wide range of spiral system applications that can accommodate virtually every turn radius, have universal collapse factors regardless of width, and are designed with open areas for optimal use in spiral system applications. Metal belts are also more conducive to removing thermal energy, compared to plastic belts, allowing for a quicker reduction of product core temperature and reduced dwell times. This results in lower refrigeration costs and minimizes the risk of product spoilage.

The following comparison outlines the many advantages metal belts have over all plastic belts.

	METAL BELTS	ALL-PLASTIC BELTS
Cleanliness*	Stainless steel shows weaker adhesion for bacteria (Salmonella and Listeria) and can be considered as the better type of belt material to minimize cross-contamination. Similarly, cleaning is more efficient on hard surfaces such as stainless steel. Conveyor belts consisting of multiple parts and joints, were also suspected to affect the washing step and the removal of harmful bacteria. The stainless conveyor belts have minimal surface area for bacteria to attach. Stainless conveyor belts can also better withstand cleaning and sanitation agents. Therefore, stainless steel belts reduce the risk of cross-contamination of the product.	All plastic conveyor belts have more interlocking sections and more surface area for bacteria to attach. In addition, because all plastic belts have a softer surface, bacteria like Salmonella and Listeria are more susceptible to attachment. The increased risk associated with the use of plastic belts in food processing increases the risk for cross-contamination of product. In order to minimize bacteria attachment, belts must be cleaned and sanitized more often. The increase in frequency raises sanitation cost because more chemicals are used. The additional time it takes to get the belts clean is another added cost.
Repair	While repairs may take longer to complete, the frequency of repairs is often less than that of plastic belts.	Less resistant to impact, means belt module repairs are more frequent. In bakery applications product fines and sugar can wear plastic rods, making rod removal difficult and time consuming.
Cost of Ownership	Less expensive than all-plastic belts. Metal can be fully recyclable and keeps a residual value to the end user and this will help offset installation costs when the belt is recycled.	Historically, because all-plastic belts are petroleum based, they are more expensive. Plastic is costly to dispose. Acetal (freezer belts) is not only difficult to dispose of, it's process is very damaging to the environment.
Material's Impact on Food	The move to alternative grades of stainless steel, such as 200 series material, and education on how to properly clean a stainless steel belt have all but eliminated black speck issues. Advancements in metal detection over the years have made it easier for manufacturers to identify metal particles in the food they produce.	It is difficult to detect small plastic particles (plastic dust) in food products. Optical scanners have difficulty in detecting small particle sizes. Difficult-to-detect plastic increases the manufacturer's overall belt cost. Difficult-to-detect plastic particles also increase the potential for cross-contamination of product.

SUSTAINABILITY FACTOR

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*As reported in this article in Poultry Science: http://ps.oxfordjournals.org/content/91/8/2004.full

	METAL BELTS	ALL-PLASTIC BELTS
Product Diversity	A broad range of designs are available for a large spectrum of spiral system applications.	There are fewer designs available for spiral system applications.
Collapse Factor	Collapse factor does not change with the width.	Collapse factors vary across the range of different widths. In most cases, if you change the belt width, it alters the collapse factor.
Turn Ratio Range	Ashworth offers an extensive selection of options suitable to accommodate almost all turn radii. The minimum turn ratio for an Ashworth belt is 0.8 to 1. to a max of 5.0 to 1.	The minimum turn ratio is 1.1 to 1. Belt options are limited for oversized spiral cages.
Open Area	Offers the most open area for spiral system applications. Opening sizes can be customized to achieve the customer's desired product temperature in both cooling and freezing applications. The range of opening sizes provide the customer with more product support options.	The range of open area can limit the customer's ability to achieve a desired product temperature in both cooling and freezing applications. Limited range of opening sizes limit a customer's ability to achieve desired product support.
Thermal Conductivity	They are more conductive for removing thermal energy, which allows for a quicker reduction of product core temperature and reduces dwell time over plastic belts. This results in lower refrigeration costs and minimizes the risk of product spoilage.	Inhibits reduction of thermal energy which prolongs the time it takes to lower product core temperature. The extended dwell time increases refrigeration costs and could increase the risk of product spoilage.
Energy Efficiency	The contact surface of the metal belt is capable of reaching the same temperature as the atmosphere within a spiral freezer. This allows for an efficient use of the energy required to operate refrigeration compressors. The use of metal belts does increase system load, which can result in a rise in amp draw. Start-up generates only a minimal increase in system energy consumption and does not increase the compressor energy consumption.	When considering switching to an all-plastic belt in a spiral freezer, consider both system amp draw and compressor energy consumption. Plastic belts are lighter weight and reduce system load, lowering the system amp draw by a minor amount. While lighter in weight, all-plastic belts act as an insulator within a freezing system and require lower operating temperatures to achieve a comparable dwell time. Lowering the operating temperature leads to an increase in the amps required by the compressors in the engine room, and can increase energy consumption by as much as 7%.

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	METAL BELTS	ALL-PLASTIC BELTS
Belt Width	The widest standard width offered by Ashworth for spiral system applications is 54 inches for Small Radius Omni-Flex® and Omni-Pro® belts. Wider belt widths are available based on custom application requirements. Fewer belt supports are required. Belt support spacing is based on product load requirements. For belt widths up to 30 inches, two belt support rails are required. Belt widths greater than 30-inches may require additional support rails, depending on combined belt and product loading.	Available in widths up to 54-inches and several 60-inch wide belts have been installed. Require more belt support rails than metal to prevent deflection. Belt widths greater than 24 inches wide require five or more support rails.
Belt Weight	Dependent on width.	Wide width belts have more mass to support product load. The increased mass can make the all-plastic belt heavier than some 1.5 inch pitch metal belt designs.
Belt Tension	Ashworth belts are tested for 100,000 cycles at maximum rated belt tension.	Break strength
Belt Strength	More resistant to impact, but are susceptible to fatigue.	More fatigue resistant, but have poor impact resistance and become brittle at freezing temperatures.
Life Cycle	Ashworth metal belts have a well-defined and tested life cycle rating of 100,000 fatigue cycles, which is based on a design maximum tension limit. The tension limit is established based on rigorous tension testing under significant loads prior to releasing the belt for sale. This has been Ashworth's standard for testing belts for 75 years.	Have a stated higher life cycle rating and are less susceptible to fatigue failures; the life of these belts are significantly impacted daily by UV exposure, thermal expansion and contraction, impact with fixed structures, and exposure to cleaning and sanitizing agents.