Technical Article
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The Basics of Lightweight Conveyor Belting

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The overall belting market share for lightweight conveyor belting has increased modestly over the past several decades. The primary reasons for the increase are process automation, market globalization, and competition. Process automation has resulted in increased demands on belting that often require the properties of a lightweight belt design. The move toward faster process and transport speeds, combined with compliance to increasingly strict standards in areas such as noise and sanitation, has also favored the growth of lightweight belting.

Lightweight Belt Categories

The lightweight belting market is primarily made up of thermoplastic covered, solid plastic, lightweight rubber, and nonwoven belting. Each of these categories offers unique properties and advantages as summarized below.

Thermoplastic Covered

Thermoplastic coatings that can be melted and rehardened while retaining the material physical properties characterize this segment of belting. This property provides the unique advantage of high quality heat welded splices and the ability to configure belts for specific applications by adding a variety of belt accessories. The most common covers are PVC, polyurethane, and polyolefin. These cover materials provide a wide range of properties such as cut/abrasion resistance, chemical resistance, oil/fat resistance, product release, high/low friction, impact resistance, and sanitation. These types of belts are used in the following industries:

Food Processing: Industries such as bakery, confectionery, snack foods, meat and poultry, dairy, fruits and vegetables, and seafood are some examples of where lightweight belting is utilized. Automation of the manufacturing processes has led to small pulleys and process conditions that lend themselves to the flexibility and versatility of lightweight belting. The thermoplastic, heat-welded splices provide superior reliability, flexibility, and sanitary properties.

Unit Package Handling: Conveyors in post office, distribution centers and airports are becoming lighter and faster, while requirements for noise are becoming more stringent. This favors the longitudinally flexible, low friction/ low-noise polyester fabrics used in certain lightweight belt constructions.

Other Industries: Other major industries that utilize lightweight belting are pharmaceutical, treadmill, electronics, plastics, bottling/canning, textile, wood/paper, and tobacco.

Solid Plastic

Solid extruded plastic belts offer unique advantages for a number of industries. Since they are offered with no reinforcing fabric, they exhibit the highest hygiene level of any belt available. They are available in extremely durable and cut-resistant versions that together with the hygienic qualities make this belt ideal for many meat and poultry applications. The combination of properties (durability, hygiene, splicing) makes this style useful in other industries such as bakery, cereal, general food processing, glass, brick and many other related industries.

Lightweight Rubber
These belts have thermoset rubber covers that differentiate themselves from the thermoplastic covers. Typical rubber types used are natural, SBR, neoprene, and nitrile. These belts are used in many of the same applications as the thermoplastic belts; however, the rubber properties such as low temperature flexibility, grip characteristics, durability, and other physical properties make them suitable for a variety of applications. Lightweight rubber belts can be found in many industries including unit package handling (general material transfer, metering, incline/decline, etc.), food processing, corrugated industry, and general industrial use.

Nonwoven Belting
The fabric bases in the belts described above are standard woven types. Needle-punched (nonwoven) fabrics offer additional belt properties. A base of nonwoven material creates an impact-resistant construction. Uncoated versions also offer a gentle surface for handling sensitive products. The unit package handling industry utilizes high volumes of this belt style for low noise, low fray, and impact resistance.

Splicing Techniques
One of the significant advantages of lightweight belting is the splicing versatility and excellent properties of the splices. In particular, the thermoplastic category of belts utilizes that property to allow heat-welded splices that exhibit a high percentage of the original belt flexibility and strength. Typical splices possible in the lightweight category are:

1. Mechanical (metal)**:** For all lightweight belt types. Offers quick installation and low cost with some potential disadvantages such as reduced flexibility, noise, pollution, and product damage.

2. Finger and Double Finger**:** Primarily used on thermoplastic belts. These heat-welded splices offer excellent flexibility and high strength particularly with the double finger. The double finger is also more reliable in polluted environments, v-guided belts, and in side loading circumstances.

3. Step**:** This splice retains the highest percentage of the belt strength and is used in heavier applications. It is also more reliable for trough applications. Hot or cold (glued) splices are used on the thermoplastic belt style while a glued cold bond is most commonly used on the rubber belts.

4. Skive**:** This is a common splice for nonwoven belts and is an alternate splice for thermoplastic and rubber belting. This splice can be done as a hot- or cold-glued splice.

5. Plastic spiral: Nonmetallic plastic lacing is mostly used with thermoplastic belting. A main use is in the food industry for metal detectors or wherever you want to avoid metal. It also is quieter and more

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reliable than metal lacing in many high-speed applications and is, therefore, finding wider use in the logistics industry.

6. Quick butt weld: A convenient and quick butt weld is possible with the solid plastic belts using specialized splice equipment.

Tracking
One of the most important aspects of using lightweight belting is proper belt tracking. Improper tracking leads to short belt life, increased downtime, equipment damage (over-tensioning) and product damage. The major causes for mistracking are the *conveyor*, the *application*, and the *belt*.

Options available to correct tracking problems fall into one of two categories: fixed tracking techniques and variable tracking techniques.

Fixed Tracking Techniques
These are solutions that are fixed in place or adjustable manually.

Variable Tracking Techniques
These solutions automatically adjust to changing tracking conditions.

Automatic tracking systems, which adjust tracking rollers by sensing the belt edges using a point of reference such as mechanical finger, air actuated or optical sensor.

Conveyor Design Rules of Thumb
The following is a brief guide regarding conveyor design important to the proper functioning of lightweight conveyor belting.

Roller Support
- Flat carrying rollers
- Trough assemblies

Slider Support
- Construction: low-friction surface such as steel, stainless steel, or hard plastic, never painted
- Width of support: belt width + 50mm

Belt Support Return Section
- Pitch of return rollers: 2-3 meters

Drive Drum
- Position: preferably at the head of the conveyor resulting in a pulling arrangement

- Arc of contact with belt: as large as possible; > 180 degrees
- Coefficient of friction: as high as possible; use lagging material if needed

Tensioning Device

- Method: tail drum
- Amount of tensioning: based on calculations of frictional forces

Knife Edge Transfer

- Arc of contact: as small as possible; preferably < 135 degrees
- Friction: as low as possible; polished low friction material