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**5 tips to ensure a
prolonged lifespan
of conveyor belts**

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Introduction

Constructing a mobile installation in the recycling industry often proves to be a challenge for the manufacturers. For example, the installation has to be as compact as possible and has to have as low a weight as possible. This will make the installation easily transportable, which means it can be transported along public roads.

When creating a new installation there are a number of do's and don'ts. In this whitepaper, we will share these points of attention, and how they may influence the longevity of conveyor belts.



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TIP 1

Drive and return pulley

Drive and return pulley

The drive and return pulley is the most obvious subject. Here there is an ongoing field of tension between commerce and technique, usually with a focus on the shape and pulley diameter. Manufacturers often cross the theoretical boundary in this regard, due to their practical experience with existing installations or similar applications that they see from competitors. Based on shape, the best option is to go for a crowned drive and return pulley. In doing so, the convex and three-part crowning have the most traditional shape.

When it is performed properly, this crowning has a self-directing effect on the conveyor belt within the carrier/cassette. Apart from the aforementioned traditional drive and return pulley, there are several variations identifiable. Theoretically these would not be correct, but practice proves otherwise. This is based on the directing properties and the functionality including the longevity of the conveyor belt.

Based on practical experience a choice can be made for deviating shapes and/or solutions. That requires a look at the following issues:

- The eventual shape
- The difference in diameter within the pulley
- Additional pulley lagging

When crowned excessively, this may lead to large tension differences in the conveyor belt. Especially when the belt tension is too high. When the crowning is too heavily pronounced, what might occur is that the conveyor belt can not properly recline laterally. This will not benefit the directing properties. A real no-go are cylindrical pulleys. They have no directing properties.



TIP 2

**Layout of the
carrier/cassette**

Layout of the carrier/cassette

An important criterion for the layout of a carrier/cassette within a mobile installation is whether it is pushing or pulling. Due to the limitations within the mobile installations and the weight of the drive pulley, the choice is often made for a pushing installation. This allows the drive pulley to remain positioned low in the installation, and it's also beneficial to counter weight issues. And by doing so, the cabling/hydraulics don't have to cover long distances.

In a situation with a pulling system, the conveyor is directed better and it runs smoother. The tension is then located on the upper side. A pushing installation often causes the conveyor belt to run around a bit, with possibly even some dragging issues, which needs to be guided with aids. In this installation, the tension is mainly located on the return. Here one should be very careful with an overcompensation in belt tension, to improve the directing properties.

Another important focal point is the choice of the available tensioning range, including the basic belt and corresponding rack. The preload and the load of the product also play a part in this choice. It can lead to skidding in laden condition. Installations such as this often have limited space, which means that a conveyor belt might be at the end of its tensioning range quite quickly. Should it happen in the field during retensioning, the conveyor belt will start skidding on the drive pulley. This can be caused by too little belt tension and/or a too heavy load.

To prevent this, a useful aid might be a snub pulley, located just before the drive pulley on the return. This increases the envelopment and creates more friction. However, a snub pulley isn't possible for all conveyor belts. Another aid might be pulley lagging, consisting of rubber or another material. This increases the friction, which means less belt tension is necessary compared to an uncoated drive pulley. The manner of support of the conveyor belt also for a large part determines the control characteristics of the conveyor belt on the installation.

When the choice is made to solely rely on carrier rollers, it will be optimal and cause the least amount of friction. When there is a mix of carrier rollers, slide plates and sliding strips, the additional friction may contribute to bad control of the conveyor belt. Especially when the differences in height between the carrier rollers, slide plates and sliding strips are not properly aligned. To keep the product centred, a small V-shape is often fitted in the carrier/cassette. This often consists of raised sides in the shape of sliding strips.

Initially, the conveyor belt will want to steer on this, and wear more as a result. Especially combined with a belt construction that isn't flexible in width. Scrapers are not often applied in a mobile installation. These installations often include profiled or confectioned conveyor belts with carriers and/or wavy edges. A scraper can, however, easily be applied on the inside if necessary. When the conveyor belt is completely smooth, you do often find a scraper located on the transport side.

TIP 3

Tools for belt control



Tools for belt control

When the choice is made for a certain shape of the drive and return pulleys, the layout of the carrier/cassette and belt construction require aids for the belt control. Theoretically, the combination of the installation and conveyor belt has to be straightforward. However, in practice this is rarely the case. Often, a decision is made to use aids to realign the conveyor belt for the return pulley or along the length of the carrier.

Another focal point is that mobile installations, especially in the field, are not always positioned straight and level, or may have a lopsided belt load due to the nature of the transported product. A frequently used solution are slanted guiding rollers just before the return pulley. They ensure that the conveyor belt realigns with the return pulley. Depending on the angle in

which they are positioned, the guiding rollers create an increased belt tension in the area where the conveyor belt and a weld run along. This often has a negative effect on the weld in this area. It may even tear when the combination of the angle, belt tension, choice of the basic belt and the execution of the weld are incorrect for the specific application. Apart from slanted guiding rollers, vertical guiding rollers are also often chosen. These should correct any possible misalignment of the conveyor belt. Again, various shapes are possible. Vertical guiding rollers can be located across the entire installation, depending on the theoretical and practical knowledge. Additionally, continuous supporting rollers with boundary discs are also used. These ensure that the conveyor belt actually stays in place.



TIP 4

Belt construction

Belt construction

The chosen belt construction and technical execution are very important for the guiding properties, the layout of the installation, the pulley diameters or the tensioning range. Where the pulley diameters are often very small combined with high belt speeds, the conveyor belt, and especially the carcass, is subject to a heavy dynamic load. So, it's crucial to select the right construction of the carcass. This is where the total thickness of the layers and the chosen fabric play a crucial role.

It is important that one carefully looks at all factors mentioned. Because all of these elements, including the belt construction, determine how the conveyor belt behaves on the installation in the field with the end customer, both unladen and laden. In addition, this mix can be decisive for potential delamination of the carcass when the actual configuration of the basic belt doesn't match with the layout of the installation.

A stable belt construction, by means of a sturdy carcass, can possess excellent guiding properties. However, this construction is often rigid, which means (too) small pulley diameters aren't an option, or other aids with regard to belt control are necessary. One can also opt for a thin carcass in which the belt construction becomes much more flexible and more suitable for (too) small pulley diameters. The guiding properties do, however, decrease in such constructions. This causes control issues. And this doesn't even include the various different fabric types or rubber compounds.

So-called hybrid constructions are also an option. These combine a mix of properties into a belt construction that is suitable for a specific layout of the installation. One may, for example, think of rigid properties versus non-rigid properties. Or a lot of stretch versus little stretch. The options are nearly infinite. These options are often situated in the area of conveyor belt fabrics. These largely define the eventual properties of a conveyor belt.



TIP 5

Welding techniques




Welding techniques

Apart from the chosen belt construction, consideration will need to be given to the execution of the weld, including the direction of rotation. Here, the focus is on several things such as pulley diameters in combination with the belt speed and the layout of the carrier combined with aids. Other aspects are the use of scrapers on the inside or outside of the conveyor belt, multiple directions of rotation and whether the installation is pushing or pulling. When an installation is pushing, it often requires more belt tension to control the conveyor belt properly and to keep it under the correct tension. This often puts more stress on the weld than in a pulling installation.

(Too) small pulley diameters in combination with the belt speed, may often lead to an adapted version of the weld. For example, the length of the steps in combination with a specific direction of rotation in order to distribute the dynamic force on the weld more evenly when the weld travels over the pulleys. And the choice of the eventual slant also plays a big part where possible. Some belt constructions do not allow the application of a slanted weld.

Aids to control the belt within the layout of the carrier also often create additional stress in the weld. Consider the aforementioned guiding rollers. This calls for necessary adaptations to the weld to increase the final strength of the zone in which the aids strain the weld. One can think of additional overlaps, adding additional fabric or a weld with 100% overlap. By default, a weld has an integrity of less than 100% because a 100% overlap is almost never possible.



When scrapers are used, careful consideration should also be given to the direction of rotation. A moving weld is always preferred when scrapers are applied. When using two scrapers (inside and outside), it shall need to be reviewed which composition is the most aggressive, in order to make the right choice. The choice of material for the scrapers also plays a part, including the finish of the weld (evenness).

At LBS, we make use of a high-end machine park where we use hot vulcanisation for all conveyor belts used in mobile installations, with the help of a high-end and repeatable process. This provides the optimal connection and final strength of the weld.

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