

Getting the best from your conveyor belts

The durability and efficient performance of conveyor systems can be critical factors in both productivity and cost management. The belt itself is often the most vulnerable part of a conveyor system because they are used to transport some of the hardest, sharpest and most abrasive materials in the world.

Conveyors have been used for many years and remain a highly effective method of on-site transportation. During recent years, the technology used to manufacture conveyor belts has advanced enormously and today's users of belts should rightfully expect a much higher level of performance and longer operational life from their belts. Sadly, this is often not the case. Getting the best advice and guidance is not always as easy because for many suppliers and service companies, conveyor belts that last longer and require less maintenance are not good for business. All too often, their philosophy seems to be "sell cheap and replace often".

As if to confuse us even further, conveyor belt suppliers (and the companies that fit and maintain them) also seem to have developed a language all of their own. So, for the benefit of our readers who use conveyors but may not necessarily be conveyor belt experts, we asked for help from Dunlop Conveyor Belting, who are one of the world's leading manufacturers and has a long-established tradition of developing high-performance rubber multi-ply belts. Dunlop manufactures conveyor belts in the Netherlands and has offices, warehouse and service workshops located in Mikolow.

In this issue of *Transport*, the manager of Dunlop Conveyor Belting in Poland, Dawid Pasinski, explains conveyor belt construction and gives advice on how to choose the best type of belt to handle abrasive and aggressive materials.

Conveyor belts - the basic structure

Rubber belts with 'multi-ply' textile reinforcement are the most commonly used type within Polish industry and usually consist of two elements. Firstly, there is the carcass, which typically contain layers of extremely strong but flexible fabric embedded in the rubber. It is the carcass that provides the inherent characteristics of a conveyor belt such as its tensile strength and elongation (elasticity or 'stretch' under tension).

OUTLINE OF A CONVEYOR BELT

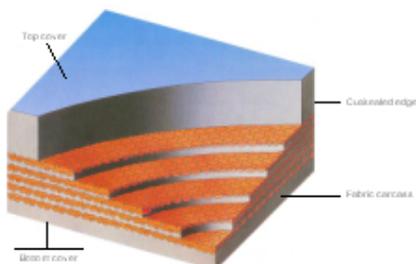


Diagram of a conventional multi-ply conveyor belt

An outer cover of rubber protects the belt carcass. Different types of rubber compound are used for rubber multi-ply belting covers; each designed to withstand damaging effects such as wear caused by abrasion, tearing and cutting, heat, fire and oil penetration. These different covers are generally referred to as "cover grade qualities". The most commonly used type of cover grade in Poland is abrasion resistant.

Making the right choice

Selecting the best type of outer cover will largely determine the effectiveness and operational lifetime of conveyor belts. The wear resistance qualities of a conveyor belt are one of the major factors that determine its life expectancy and ultimately the truest test of its value for

money. As a general rule, 80% of conveyor belt surface wear occurs on the top cover of the belt with approximately 20% of wear on the bottom cover.

Wear on the top cover is primarily caused by the abrasive action of the materials being carried, especially at the loading point or 'station' where the belt is exposed to impact by the bulk material and at the discharge point where the material is effectively 'accelerated' by the belt surface. Contrary to popular belief, short belts (below 50 metres) usually wear at a faster rate because they pass the loading and discharge points more frequently compared to longer belts. For these reasons, the selection of the correct type of cover quality and the thickness of shorter length belts becomes even more important than usual.

Wear on the bottom cover of the belt is mainly caused by the friction contact with the drum surface and idlers. The rate and uniformity of this type of wear can be adversely affected by many other factors such as misaligned or worn drums and idlers set at incorrect angles. Factors such as ozone penetration or an unclean environment where there is a build up of waste material can accelerate wear. Belt cleaning systems, especially steel edged scrapers, can also cause wear to the top cover surface.

Thicker is not always better

The actual thickness of the cover is an important consideration. In principle, the difference in thickness between the top cover and the bottom cover should not exceed a ratio of more than 3 to 1.

Generally speaking, the more abrasive the material and the shorter the conveyor, the thicker the cover should be. In reality, the actual abrasion resistance quality of the belt cover is more important than the thickness. However, in an effort to compensate for poor abrasion resistant qualities, many conveyor belt suppliers offer belts with covers that are thicker than are actually necessary, which can potentially cause other operational problems.

Different types of abrasion

It is a common misconception that a belt specified by a supplier as being 'abrasion resistant' should naturally be expected not to wear quickly. In actual fact, because of the variety of materials that are carried on conveyor belts, there are a number of different causes of wear and abrasion. For example, heavy and/or sharp objects such as rocks can cause cutting and gouging of the belt surface while 'fine' materials such as aggregate, sand and gravel literally act like sandpaper constantly scouring the rubber cover. For this reason, there are different types of abrasion resistant cover.

There are two internationally recognised sets of standards for abrasion, EN ISO 14890 (H, D and L) and DIN 22102 (Y, W and X). In Poland, it is the longer-established DIN standards that are most commonly recognised and accepted. Generally speaking, DIN Y relates to 'normal' service conditions and DIN W for resistance to abrasion, cutting, impact (from high drop heights), and gouging resulting from large lump sizes of heavy and sharp materials.

Each manufacturer uses its own mix or 'recipe' of polymers to create cover compounds that have different abrasion (wear) resistance qualities. The main polymers used are SBR (Styrene-Butadiene-Rubber) and BR (Butadiene-Rubber). Both SBR and BR have particularly good resistance not only to abrasion but also tearing, cutting, ripping and gouging. Many manufacturers try to avoid the use of natural rubber wherever possible in order to keep costs (prices) low.

Buyer beware!

It is important that buyers of conveyor belts remember that DIN and ISO standards are only the *minimum* benchmark of acceptability. Wear resistant covers that conform to international standards still often have to be replaced after unacceptably short periods. Despite the claims of the manufacturers, tests reveal that more than 50% are found to be significantly below those minimum standards.

Dunlop's approach has been to develop a range of abrasion resistant covers specifically designed to deal with both specific and combined causes of wear. To provide a longer lasting and therefore more cost-effective solution, Dunlop covers exceed international quality standards by a significant margin. An excellent example of this is their RA 'standard' abrasion resistant cover exceeds the DIN Y standard by more than 30% and is more than 20% better than even the DIN X standard. Dunlop's RE cover mainly consists of natural rubber and also exceeds the DIN X standard by more than 20%.

For extremely abrasive materials, or simply to achieve a considerably longer working life, Dunlop have developed their RS cover, which exceeds the highest abrasion standard (DIN W) by nearly 30% and the equivalent ISO 'D' standard by more than 40%.

The Ultimate Solution?

In some applications such as crushers, even the strongest of conventional belts such as steel reinforced, can be ripped or torn by large lumps of heavy, sharp objects, either falling from height or becoming trapped. Dunlop's answer to this is their UsFlex range of specialist heavy-duty belting, which has a rip and cutting resistance that is more than four times greater than conventional multi-ply belts that have a similar tensile strength. The resistance is not only superior to multi-ply belts but also steel reinforced, solid woven and other conventional heavy-duty belt constructions.

Seek advice

What is now clear is that there is a lot more to conveyor belts than meets the eye and that the days when conveyor belts all just seemed to be long lengths of black rubber is certainly a thing of the past. The attraction of low prices can prove to be a very expensive mistake. As often as not, the quality of a belt is reflected by its price so it is always worth the effort to check the original manufacturers specifications very carefully and ask for documented evidence of compliance.

For more information on this subject please contact Dawid Pasinski on 08604 256 449 or Dunlop's Application Engineering team on +31 (0) 512 585 555. You can see how conveyor belts are actually made by visiting: www.dunlopconveyorbelting.com