Getting the best out of your conveyor belts

In the fast-moving and aggressive environment of the recycling industry, keeping the conveyors going is one of recycling facilities' primary concerns. *Les Williams*, general sales manager at Dunlop Conveyor Belting, gives valuable advice on the right choice of conveyor belts as well as their successful maintenance.

IN THE competitive world of recycling and waste management, 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. Every time a conveyor has to be stopped to repair or replace a belt means cost, not only in terms of the actual belt itself and its fitting, but also lost production time.

Low priced belts that wear prematurely or are prone to damage by oil penetration or ripping and cutting by sharp objects invariably prove to be very expensive in the long run.

Netherlands-based Dunlop Conveyor Belting has a long established tradition of developing high performance rubber multi-ply belts that can handle even the most aggressive conditions and materials found within the recycling and waste industry.

The basic structure

Rubber belts with multi-ply textile reinforcement are the most commonly used type found within the recycling and waste 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).

An outer cover of rubber protects the belt carcass. Different types of rubber compound are used for rubber multi-ply belting; each designed to provide very specific protective characteristics. These different covers are generally referred to as "cover grade qualities".

Making the right choice

Selecting the best type of outer cover will largely determine the effectiveness and operational lifetime of belts used within the recycling and waste industry.

There are several types or grades of cover to choose from, each designed to withstand damaging effects such as wear caused by abrasion, tearing, cutting, heat and the many other potentially harmful effects caused by moisture, oil and other chemical reactions.

The actual thickness of the cover is an important consideration. Generally speaking, the more abrasive the material and the shorter the conveyor, the thicker the cover should be.

However, covers that are too thick can potentially cause other problems. 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.

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 long 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. Belt cleaning systems such as scrapers can also cause wear to the top cover surface.

Wear on the bottom cover 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 an unclean environment where there is a build-up of waste material can cause added wear on both the top and bottom covers of a belt.

Recycled problems

One of the common dilemmas faced by the recycling industry is the wide variety and often very aggressive nature of materials that are carried on conveyor belts. Sharp objects such as rocks, metal and glass cause cutting and gouging of the belt surface.

Even wear resistant covers that conform to international EN/ISO and DIN abrasion (wear) standards often have to be replaced after unacceptably short periods.

Despite the use of increasingly sophisticated sortation and filtration technology, an ever-present problem in recycling and the general handling of waste is rogue material such as metal or engine parts getting on to belts not designed to carry them and causing damage. Metal objects can even appear in cardboard and paper waste.

Many recycling companies have resorted to fitting belts with increasingly thicker covers or simply buying the lowest priced options but this, at best, is invariable only a short term answer. Not only is the cost of frequently replacing belts extremely expensive, there are also the hidden costs of fitting and lost production time.

To provide a longer and therefore more cost-effective solution, Dunlop's approach has been to design a range of abrasion resistant covers that not only meet, but exceed international quality standards by a significant margin. The Dunlop RS cover, for example, has a particularly high level of resistance to cuts, impact, abrasion and gouging.

In some cases, even the strongest of belts 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 in relation to the multi-ply EP belts, but also steel reinforced, solid woven or EpP constructions.

Oil and fat penetration

Many materials being transported in the recycling and waste industry contain oil and fat, which can have a very detrimental effect on the performance and life expectancy of a conveyor belt because it penetrates into the rubber causing it to swell and distort, often resulting in serious operational problems.

Despite the untold damage caused to rubber by oil and fat penetration there are, as yet, no recognised EN/ISO test standards.

This in itself can pose a big question mark against the oil resistance claims made by some manufacturers. In the Dunlop laboratories they apply the stringent ASTM D 1460 test standard, which originated in the USA.

Oil and fat (grease) resistance can be divided into two sources: mineral oils and greases and vegetable, animal oils and fats.

Mineral oil and grease is most commonly present when recycling metals that have either contained or been exposed to oil or grease during their operating life; engine parts and gearboxes being two obvious examples.

Mineral oils are the most aggressive and therefore require a particularly high level of protection. This is when a full nitrile belt is usually the best type to use. Dunlop recommends its ROS specification.

Vegetable, animal oils and fats are found when recycling wood and household wastes such as cardboard, plastic bottles and cans. When particularly high concentrations of animal and vegetable oils are present then nitrile compound belts (ROS) should be used.

What is clear is that there is a lot more to conveyor belts than meets the eye and the days when conveyor belts seemed to be long lengths of black rubber is certainly a thing of the past.

Choosing the wrong type can prove to be a very costly mistake so it is always worth the effort to seek professional advice from the actual manufacturers. RWW