Is finding conveyor belts that really can handle the destructive forces that cause ripping, tearing and impact damage really …

MISSION IMPOSSIBLE

Conveyor belts are critical components, and a lack of reliability and durability can literally bring things to a standstill that when they fail. Rob van Oijen, Manager of Application engineering at Netherlands-based Dunlop Conveyor Belting, explains how even the most destructive of forces can be better handled.

The reality is that even the strongest, heaviest standard belts can be punctured and ripped and the cost of repairing and replacing them, both in terms of direct outlay and in lost production, can be eye-watering. Despite this, belt manufacturers rarely mention their belt's ability to resist ripping and tearing.

Rip and tear-resistance testing

Especially when it comes to heavy plant equipment, the ability to withstand the forces that rip and tear belts is often more important than any other physical attribute. A 'rip' is best described as what happens when a sharp object punctures the belt and cuts the belt lengthwise as it is pulled against the trapped object. In contrast, a 'tear' is what happens when a section of belt is pulled apart in opposing directions, much like when a telephone directory is torn apart by hand as a feat of strength.

Sacrificial belts rarely make economic sense

Surprisingly, despite its significance as a key performance indicator, there are currently no internationally accepted test methods or standards for testing rip resistance, which is perhaps one reason why most belt manufacturers rarely mention the subject. However, in Dunlop we see rip and tear strength as being extremely important KPIs. What our laboratory technicians do is pull sections of belt through a right-angled piece of metal under extreme force and carefully measure and record the level of force exerted. The technicians have nicknamed the specially designed equipment they use for this harsh treatment 'Jack the Ripper'.

Unlike rip resistance, an international standard for tear strength does exist. The ISO 505:2017 test method measures the propagation resistance of an initial tear in textile conveyor belts, either in full thickness or of the carcass only. The test is intended for application to multi-ply (fabric) belts in installations where there is a risk of longitudinal tearing.

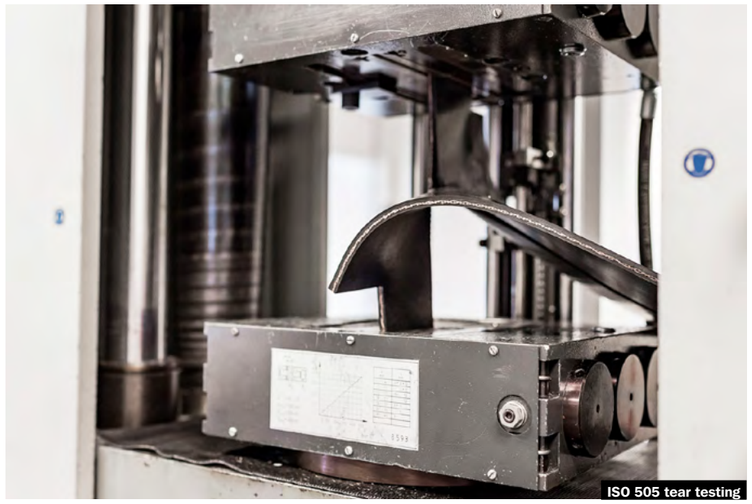
Although it is a defined method of testing there are no standardised performance requirements. The test, often referred to as the 'trouser test', basically consists of mounting two cut ends of a test piece of belting in the jaws of a tensile testing machine. An initial tear is made in the test piece, which is then pulled apart in opposing directions. The force necessary to propagate the tear is then measured. Examination and analysis of the multi-peak tear resistance test traces is made in accordance with ISO 6133.

Rob van Oijen.

Finding the best solution

Because of the huge disparities between the types of materials being conveyed and the huge variety of machinery, equipment and working environments, there is no 'silver bullet' answer to the damage caused by ripping, tearing and impact. In my experience, it is probably easier to start with what will almost certainly NOT be the answer to the problem, which is the common misconception that making the belt thicker by increasing the cover thicknesses and/or the number of plies will help. The fact is that belts that are too thick for the design of the application can cause problems such as excessive rigidity (lack of troughability). In the case of mobile machinery, the notoriously small pulley diameters cause carcass and joint failure due to dynamic stress. The same problems can apply when the tensile strength is increased. Especially in Eastern Europe for some reason, it is not uncommon to see belt specifications of 1000/6 10+4 or even heavier. Whenever I see specifications like these, I can be pretty sure that there is an underlying problem with ripping or tearing or impact damage and in some cases all three.

Dunlop's 'Jack the Ripper' rip test in action



ISO 505 tear testing

Engineered for the task

For equipment where ripping and tearing is a problem, the only genuinely practical solution is to fit a conveyor belt that has been specifically engineered for the purpose. Such belts can have several times the resistance against ripping and tearing and cope with the impact of heavy objects such as large rocks falling from a high drop height much more effectively compared to belts that use a conventional fabric ply construction.

Fitting thicker and thicker belts is NOT the answer

Easy come, easy go. It's cheaper to fit a belt that has been specifically engineered for the purpose

The key difference between conventional fabric ply belts and belts specifically engineered to resist ripping, tearing and impact is that they use uniquely designed fabric plies that allow the nylon strands to stretch. As the trapped object is being pulled through the belt, the strands of the special ply construction gather together into a bundle that can eventually become strong enough to stop the belt.

Strange as it may seem, these special synthetic plies are usually more effective than steel when it comes to actually minimising the length of a rip. I am an engineer, not a salesman, but I can tell you in all honesty that the two best examples that I have ever come across are Dunlop UsFlex and Dunlop Ultra X. They are both totally unique to Dunlop and both belt types have at least three or more times the resistance to ripping and tearing compared to conventional belt. To find out more simply go to: https://www.dunlopcb.com/cover-grades/rip-impact/.

Not worth the sacrifice

Rather than look for belts that are capable of handing the demands, many operators decide to opt for what they see as the cheaper option by fitting low-grade, 'sacrificial' belts which are then repaired and replaced at frightening regularity.

When you add the cost of incessant repairs, the fitting costs and, most of significantly of all, the lost production, to the cost of buying replacement belt after replacement belt, it very rarely proves to make economic sense.

- Rob van Oijen.

About the author

Rob van Oijen is Manager Application Engineering for Dunlop Conveyor Belting in The Netherlands. Rob has specialised in conveyors for some 14 years, supporting businesses throughout Europe, Africa, the Middle East and South America.