

BREAKING NEW GROUND

There is a new breed of conveyor belt on the market. By **Leslie David**

Conveyor belts perform an enormously important function in the recycling and waste industry. They are also a very significant overhead. Although reliability and durability are very important considerations, finding a belt that is super-tough and genuinely good quality, but which is also competitively priced, might be regarded as looking for the Holy Grail.

Just over a year ago, Dunlop Conveyor Belting in the Netherlands and its sister operation in North America (Fenner Dunlop Americas) introduced a new design of belt that they claim is not only considerably more durable and tougher than conventional ply belting but also extremely competitive on price. In Europe, Dunlop has branded the product Ultra X.

The market is dominated by 'economy' belting imported from South East Asia. This dominance is much greater than many might think because it is not uncommon for European belt manufacturers to import from Asia to supplement their own production, thus enabling themselves to offer low-price belting to their customers in Europe.

However, Dunlop Conveyor Belting in the Netherlands has always refused to play this game. Instead, it focuses on 'lowest cost' rather than the lowest selling price by offering belting that provides a much longer operational lifetime along with heavy-duty belting and

specialist belting such as fire- or oil-resistant. Although this strategy has served it well, its research and development teams have still continued to search for a super-tough, high-quality belt that can also compete at the economy end of the market.

Thinking outside of the box

Even the strongest, heaviest belts can be ripped, torn or punctured by hard, sharp materials becoming trapped. "Accidental damage is something that all conveyor operators have to contend with," says Michiel Eijpe, Dunlop's development director. "Foreign objects get trapped and belts can often be destroyed within the blink of an eye. Using low-grade 'sacrificial' belts invariably proves to be a false economy for a lot of reasons including loss of production

and high maintenance and the high cost of frequently having to fit replacement belts."

According to Eijpe, the problem of rapid wear caused by abrasion was solved long ago. "Our belts are well-recognised as being the longest-lasting belts on the market. For us, the rubber covers are always the easy part. The biggest challenge was designing a belt that could really handle impact, ripping and tearing which at the same time could be priced competitively."

Dunlop's engineers and technicians went back to the drawing board to create a super-strength 'breaker weft construction' single-ply belt based on a tough patented fabric that is exclusively made in their in-house weaving facility in the US.

The fabric has more than three times greater longitudinal rip resistance and up to five times better tear resistance, and a far superior resistance to impact, compared with traditional three-ply or even four-ply belting.

What's the big secret?

Ultra X owes its enormous strength to its specially woven carcass, which uses crimped warp polyester yarns to provide high strength and low stretch. These are combined with strong 'binder' and 'filler' yarns to create strength and stability under load to give exceptional rip, tear and impact resistance.

Throughout its development, sections of belt were repeatedly tested to destruction. The tear

resistance of Ultra X is strictly measured according to the international EN ISO 505 standard.

Ultra X is available in two strengths: Ultra X1 (Type 330), which is designed for users of EP315/2 and 400/3 conventional ply belts; and Ultra X3 (Type 550), which is designed to replace EP500/3, 500/4, 630/3 and 630/4 ply belts.

The fact that Ultra X is a single-ply construction belt designed to replace conventional two-, three- and four-ply belts has already raised quite a few eyebrows among traditionalists. The first question is how a single-ply belt can provide sufficient tensile strength and yet still have such high levels of rip, tear and impact resistance? Rob van Oijen, Dunlop's manager of application engineering, explains the hows and whys.

"We keep coming back to the genuinely unique fabric that we are using. Besides being able to withstand the kind of punishment that would destroy a normal belt, Ultra X has amazing tensile strength. The longitudinal tensile strength of the X1 is 330N/mm and the X3 has a longitudinal strength of 550N/mm.

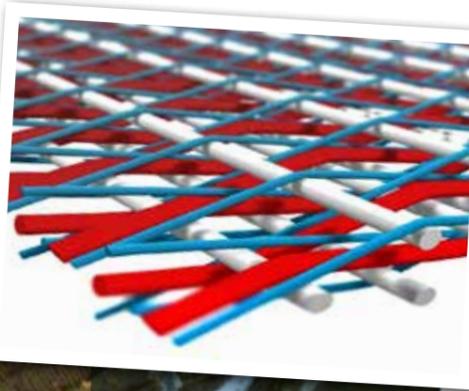
"The fact is that we stepped away from the conventional range of multi-layer belting for good reason.

"A single-ply construction requires a finger-splice joint to be made and the big advantage of finger splice joints is that they retain up to 90% of the belt's tensile strength, whereas a two-ply step splice only retains a maximum of 50% and a three-ply step joint

can only achieve a maximum tensile strength of 67%."

"When such a high level of splice efficiency is combined with the X1 and X3 tensile strength then at the very least it effectively creates equivalent tensile strengths and belt safety factors that would be expected from comparable conventional belting. Belt safety factors are one of the prime selection criteria so this is a really important advantage."

Van Oijen admits that finger splices do take longer to make (initially about 30% longer, but such a difference would be expected to reduce quite significantly with growing experience) and are a turn-off for some. However, he is convinced that with a little help and encouragement, that viewpoint can be changed. "The technical and economic arguments in favour of finger splicing are unquestionable. Finger splice joints are stronger and more durable. Ultra X has an appreciably better performance compared to conventional ply belts so this means that the need to repair and re-splice joints is much less frequent.



Top: Dunlop's Ultra X single ply fabric



Left: A badly damaged conveyor belt

No. of plies	Maximum % tensile strength
1	90%
2	50%
3	67%
4	75%
5	80%

"To help our customers we supply the splice kits including finger pattern templates, materials and tools, a guide manual and a training film. We even provide training and supervision where warranted."

For those who remain dead set against the idea of finger splicing, the good news is that Ultra X just happens to possess excellent mechanical fastener retention. There certainly does not appear to be any question mark against the overall strength of Ultra X because an Ultra X3 is able to pull up to 56 tonnes.

Endless opportunities

Another advantage of Ultra X is that it is flexible enough to be used on smaller drive pulley diameters. "The X1 drive pulley diameter for over 60% rated tension can be as small as 315mm, and the X3 drive pulley diameter, again for over 60% rated tension, can be as small as 400mm," says sales and marketing director Andries Smilda.

"This means that Ultra X is ideally suited to run on the kind of mobile machinery that has always been notorious for having small pulley diameters. The problem is that design

tolerances and the dynamic stress placed on the inner carcass and the splice joint by continual flexing over small diameter pulleys seriously limits what can be fitted. Ultra X overcomes that problem."

Dunlop launched Ultra X more than a year ago. It was a deliberately low-key affair and under the radar of most of the market. Smilda explains: "We knew from the years of research and intensive laboratory testing that we were onto something special. But we still wanted to prove it in the field so we worked with several end-users."

Competing on quality and price

There are several reasons why Dunlop can price Ultra X competitively without loss of quality. The single-ply carcass is made from fabric manufactured in-house – a big advantage both quality and cost-wise. Having a single-ply construction also allows for maximum efficiency of production because there are fewer calender runs. And having no rubber skim between the plies not only results in a thinner, stronger carcass, it also keeps the cost down.

Dunlop is making longer production runs at a maximum width of 2000mm and is only selling Ultra X in full roll lengths of 300 metres. Endless and 'pre-prepared' belts need to be ordered in multiples.

Smilda adds: "Selling and shipping short lengths creates additional costs that impact on the selling price, but for all customers starting out with Ultra X for the first time we are of course trying to be as flexible as possible."

From creating the very first fire-resistant belts to its heavy-duty application belting, innovation is clearly part of the Dunlop culture. If the recycling and waste industry can look beyond its long-held beliefs and preferences then the Ultra X could be a game-changer. **RWW**