

Breaking new ground

It's fair to say that most people would view industrial conveyor belts simply as long lengths of thick black rubber that have to carry things from one end to the other, which is not very exciting and hardly rocket science surely?. In reality, conveyor belts perform an enormously important function and have to cope with all manner of potentially destructive materials, often in very demanding environments. Creating rubber compounds and belt constructions that can do these things is actually a surprisingly complex science.

Although rubber belt technology has progressed quite considerably in recent years, there has not been a genuinely ground-breaking advance for a very long time indeed. Until now it seems, because Dunlop Conveyor Belting in the Netherlands and their sister operation in North America (Fenner Dunlop Americas) have rather quietly introduced a very new and unique design of belt that they claim is considerably more durable and tougher than conventional ply belting. The accompanying market strategy is also to be extremely competitive on price, which certainly is not an approach that Dunlop are known for. *Here, Leslie David unearths more about an innovation that some believe will ultimately change conventional thinking on conveyor belt construction.*

THE CONVEYOR BELT MARKET

In order to appreciate the significance of what Dunlop are doing it is important to first look at the market backdrop. In terms of what conveyor belts need to handle, the vast majority of rubber conveyor belts are only required to cope with abrasive wear (abrasion resistant). The size of the market for specialist belts that need to withstand demands such as heat, oil, extreme cold or fire for example is appreciably smaller. Users of wear resistant belts are spoilt for choice because there are so many manufacturers competing for a share of a global market that is worth hundreds of millions. Conveyor belt users can opt for a high

quality belt that possesses genuinely good resistance to wear (abrasion) and therefore will provide a much longer and therefore more economical lifetime. Alternatively, at the other end of the scale, conveyor operators can choose to use 'economy' belts with the double-edged sword of exceptionally low pricing on the plus side but with much, much more rapid rates of wear on the negative side.

This 'economy' end of the market is dominated by belting imported from South East Asia. It is not uncommon for belt manufacturers and traders to import from Asia to supplement their own production thus enabling themselves to offer low price belting to their customers in Europe and elsewhere. However, one or two of the biggest players such as Dunlop Conveyor Belting in the Netherlands refuse to play such a game. In fact they do not even target this end of the market. Instead, they focus their efforts entirely on high quality long-life belting, heavy-duty specialist belting and hi-spec belts such as fire, oil or heat resistant.

Although this strategy has served them well, their research & development teams have still continued to search for what might be regarded as the Holy Grail of conveyor belting, which is super-tough, high quality belt that can compete at the economy end of the market. And now they believe that they have found just that. In the Netherlands they have branded their discovery *Ultra X*.

AN AGE-OLD DILEMMA

It is a fact that even the strongest, heaviest belts can be ripped, torn or punctured by heavy, sharp materials or foreign objects, either falling from height or becoming trapped. *"Accidental damage is something that virtually all conveyor operators have to contend with"* says Dr. Michiel Eijpe, Dunlop's development director in the Netherlands. *"Belts can often be destroyed within a matter of a weeks or months. We estimate that about 80% of all belts have to be replaced because of damage long before they are*



recognised as being the longest lasting belts on the market. For us, the rubber covers were the easy part. The biggest challenge was designing a 'problem solver' belt that could really handle impact, ripping and tearing while at the same time creating a belt that could be priced economically. To do that we focussed our attention on the actual belt construction; primarily the ply fabric itself".

THINKING OUTSIDE OF THE BOX

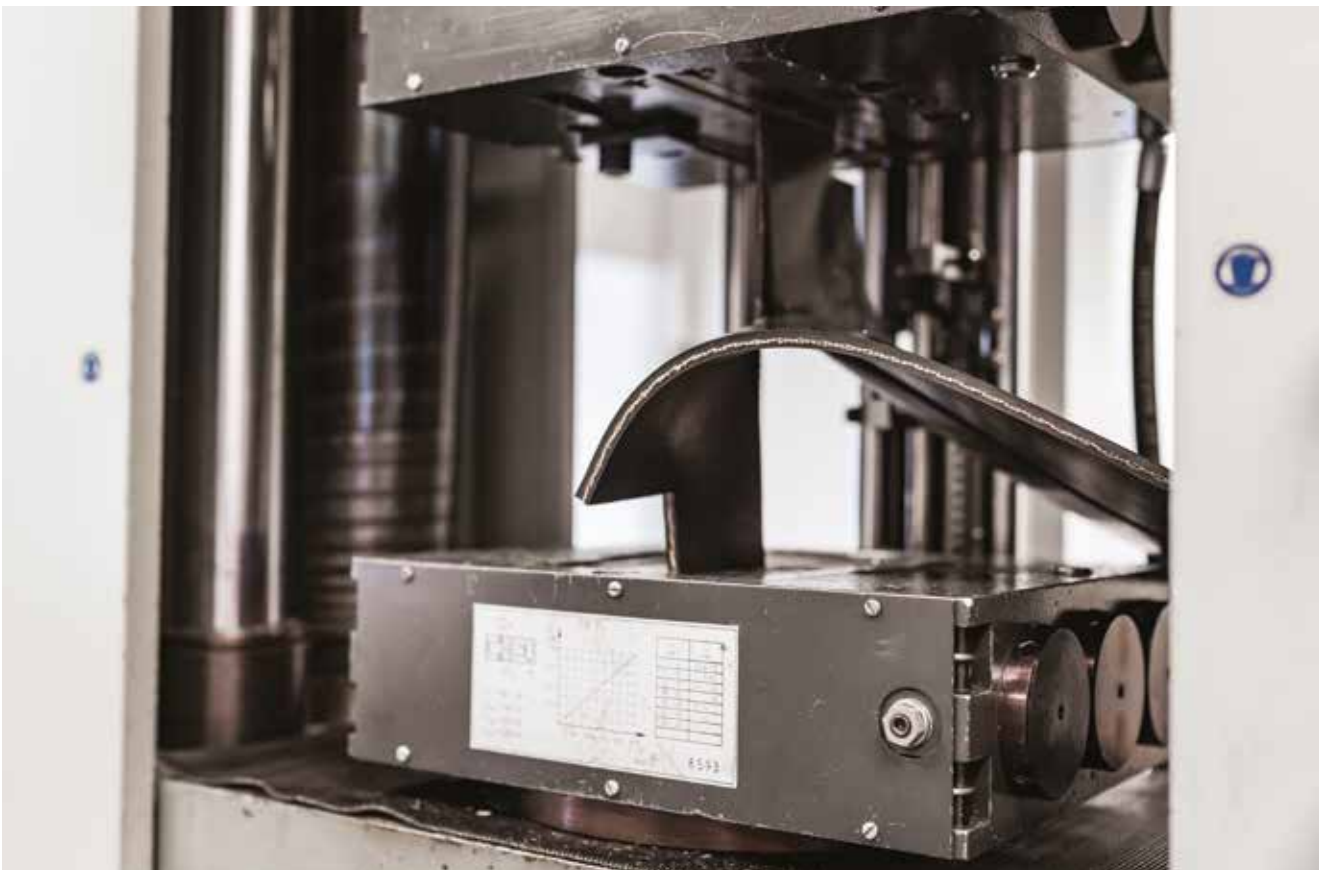
What the engineers and technicians of Dunlop on both sides of the Atlantic did was to forget convention and think outside of the box. They

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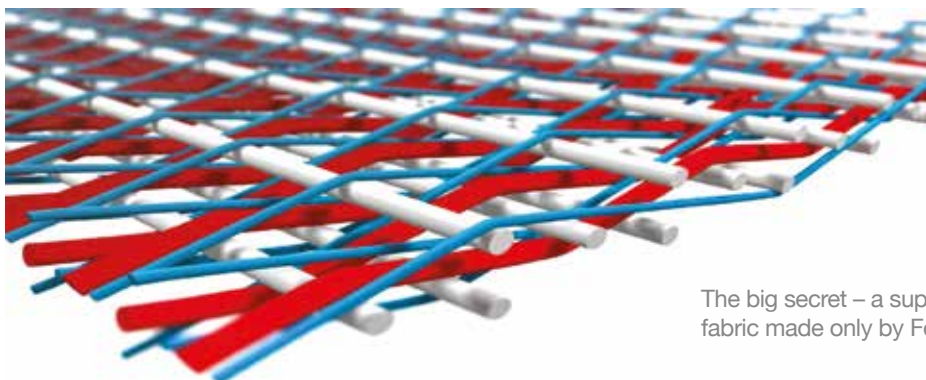
anywhere near the end of their wear life. Using low grade 'sacrificial' belts invariably proves to be a false economy for a lot of reasons including loss of production and high maintenance and the high cost of frequently having to fit replacement belts. It's an age-old dilemma".

According to Dr. Eijpe, the problem of rapid wear caused by abrasion was solved long ago. "Our belts are well-

went back to the drawing board to design and develop a new and unique super-strength 'breaker weft construction' single-ply belt. The basis of their concept is an amazingly tough patented fabric that is exclusively made in their own in-house fabric weaving facility in the USA. Dunlop say that the fabric has more than **3 times** greater longitudinal rip resistance and up to **5 times** better tear resistance and a far superior resistance to impact compared to traditional 3-ply belting.



Five times greater tear resistance



The big secret – a super-strength ‘breaker welt construction’ fabric made only by Fenner Dunlop

WHAT'S THE BIG SECRET?

Dunlop engineers say that Ultra X owes its outstanding strength to its specially woven carcass. This fabric design 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 and 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. Tests for rip and tear resistance are only made on the actual belt carcass so the top and bottom covers are always removed. This ensures that the thickness and quality of the rubber cover does not influence the accuracy and consistency of the test results.

TICKING ALL THE BOXES

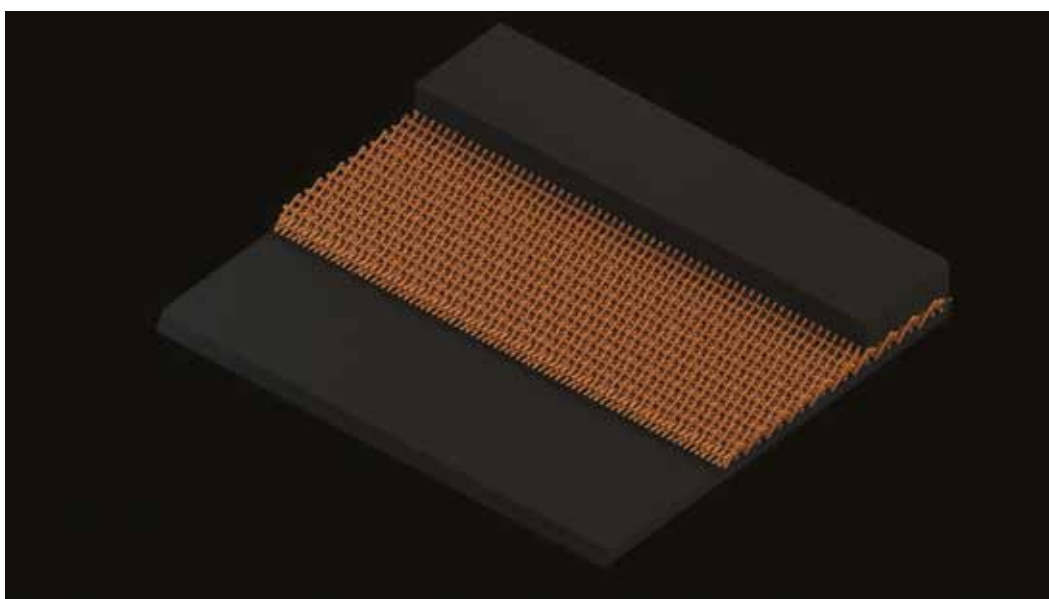
As Dr. Eijpe explained earlier, protecting the carcass with hard-wearing rubber covers was the easy part. Certainly for the time being, all Ultra X belts are produced with Dunlop AA anti-abrasion covers as standard. *“Using this grade of rubber ensures that the belt has excellent resistance against the cutting and wearing caused by coarse materials and a resistance to abrasion that outperforms typical DIN Y requirements (average loss of less than 150mm³) by as much as 20%”*

“And as with all of our cover qualities, our AA grade rubber is extensively tested in compliance with EN ISO 1431 for ozone resistance (50 pphm, strain 20%, 96 hours no cracking) and resistance to the damaging effects of UV light. We know from experience that these are essential design characteristics that are vital in helping to avoid premature replacement of the belt due to cracking of the belt surface”. Dr Eijpe was also keen to point out that all Dunlop cover qualities are produced in compliance with REACH (Registration, Evaluation and Authorisation of Chemical substances) regulation EC 1907/2006 and are anti-static according to EN ISO 284. *“Ozone resistance, REACH compliance and being anti-static are all important credentials as far as we are concerned. Besides, ticking as many boxes as possible makes it easier for the end user to choose our belts!”*

A QUESTION OF STRENGTH

Ultra X is available in abrasion resistant rubber and 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 even four-ply belts has already raised quite a few eyebrows (and questions) amongst traditionalists. The first question that seems to be on everyone’s lips is how on earth can a single-ply belt provide sufficient tensile strength and yet still have such high levels of rip, tear and impact resistance? Rob van Oijen is manager of application engineering in Dunlop’s Drachten headquarters and is clearly well-versed in explaining not only the how’s and why’s but also rather adept at throwing in some not inconsiderable additional benefits as well.



Single-ply construction designed to replace two, three and even four-ply belts



Ideally suited to run on mobile machinery despite small pulley diameters

“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 2-ply step splice only retains a maximum of 50% and a 3-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 3 or 4 layer conventional belting. Belt safety factors are one of the prime selection criteria so this is a really important advantage.”

Rob freely admits that finger splices do take longer to make (initially about 30% longer in his experience but such a

difference would be expected to reduce quite significantly with growing experience) and that they are a turn-off for some vulcanisers, especially those who only want to use cold splice techniques. 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 immensely strong and durable and when you consider the fact that Ultra X has an appreciably better performance compared to conventional ply belt it means*



The power of less. A single-ply belt that out-performs multi-ply



High levels of rip, tear & impact resistance

that the need to repair and re-splice joints will be much less frequent”.

“To help our customers we supply the finger splice kits, materials and tools, a guide manual, a training film and we even provide training and supervision where warranted”. For those who still remain dead set against the idea of finger splicing the good news is that Ultra X just happens to possess excellent mechanical fastener retention with Superscrew 63 as the recommended choice of fastener.

There certainly does not appear to be any question mark against the overall strength of Ultra X because, as their promotional film proudly states, an Ultra X3 single ply belt is able to pull up to 56 tonnes in weight, which is the equivalent of 40 mid-sized family cars or 2250 bags of cement.

ENDLESS OPPORTUNITIES

The OEM market is a specific target for Dunlop because Ultra X is flexible enough to be used on smaller drive pulley diameters. Sales & marketing director Andries Smilda says that they are already seeing a growing number of orders from OEM's for endless belts. *“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. This means that Ultra X is ideally suited to run on mobile conveyors, crushers and road machinery that are notorious for having small pulley diameters. Up until now it has been almost impossible to use high-impact, rip resistant belt because conventional ply belt has to be pretty thick to be able to take the punishment. The problem is that machine design tolerances and the*

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”.

Certainly, Dunlop in Europe are so confident that Ultra X will prove to be a game changer in the OEM market that they have geared up their endless belt production capacity, not only in Drachten but also in their service facilities in Poland and Italy.

UNDER THE RADAR

Dunlop actually launched Ultra X more than a year ago but its introduction to the market place was deliberately low-key and therefore under the radar of most of the market. Andries Smilda explains that they had many reasons for such a cautious approach. *“We knew that we were onto something special with Ultra X but Dunlop being Dunlop we still wanted to prove it in the field so we worked with tried and trusted end-users and OEM's”.* One of Dunlop's many successes so far is that Ultra X is now the belt of choice in the biggest quarry in Europe while at least one OEM has found that using Ultra X has more than doubled the average belt lifetime. *“The past year has confirmed that Ultra X is all that we thought it would be and more. Although we have several thousands of meters in use we have not had one single complaint or technical issue so now we are ready to shout about it from the rooftops”.*

When talking to Smilda he makes no secret of the next steps that Dunlop want to take. *“We are escalating the sales & marketing activity. We are primarily focussing on OEM's and vulcanisers who are progressively minded enough to see the enormous advantages of Ultra X and who are looking to gain a competitive edge over their*

competitors. This is where we see the potential to sell the kind of volumes we need to achieve sufficient economy of scale in the production process”.

COMPETING ON QUALITY AND PRICE?

There is also a surprising openness about the need to be able to “slug it out on price” in the day to day ‘economy belt’ market and why and how they are able to offer prices that are at least comparable (and often lower than) multi-ply belting. “We have not,” he says, “and of course never would, compromise on quality for the sake of a lower price offering. That is simply not our culture. Actually there are several reasons why we can price Ultra X so competitively”.

“Firstly, the single-ply carcass is made from fabric that we manufacture in-house. That’s 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 are making longer production runs at a maximum width of 2000mm and are only selling Ultra X in full roll lengths of 300 meters. Endless and ‘pre-prepared’ belts need to be ordered in multiples. “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. We know for

from experience that once they see what Ultra X can do then they will be coming back for more!”

A CULTURAL CHANGE

There is no questioning the belief and enthusiasm that everyone at Dunlop Conveyor Belting seems to have for Ultra X. There is also no question about their history of innovation when it comes to conveyor belts; from creating the very first fire resistant belts through to heavy duty application belting such as Dunlop UsFlex. It’s clearly part of their culture.

At the same time, what is also clear is that they are looking for something of a cultural change not only from OEM’s and vulcanising companies but ultimately from the end-user market as a whole. To many, the very notion that compared to traditional multi-ply belting, a relatively lightweight, single-ply construction belt can provide the necessary tensile strength together with considerably more resistance to ripping, tearing and impact; have a much greater splice strength, require fewer repairs and reduce both maintenance costs and the frequency of belt replacements is difficult to comprehend. Remember, this is Dunlop we are talking about so to do all of this while at the same time competing on price is an even bigger ask. But if the market can perhaps take off its blinkers and look just a little beyond its long-held beliefs and preferences then I strongly suspect that Ultra X really could be a game changer.

THE POWER OF LESS

3x MORE RIP RESISTANCE
Dunlop Ultra X has up to three times more rip and impact resistance compared to 3 or 4-ply belting.

5x MORE TEAR RESISTANCE
Dunlop Ultra X has up to five times more tear resistance compared to single and multi-ply belting.

DUNLOP
CONVEYOR BELTING

DUNLOP ULTRA X
"SIMPLY UNBEATABLE"

Introducing the sensational new single-ply carcass belt from **Dunlop**

Come and find out more at Bauma!
Munich, April 8 -14 Hall B2 stand 239.

Visit www.dunlopcb.com
or watch Ultra X in action on youtu.be/dunlopbelting/