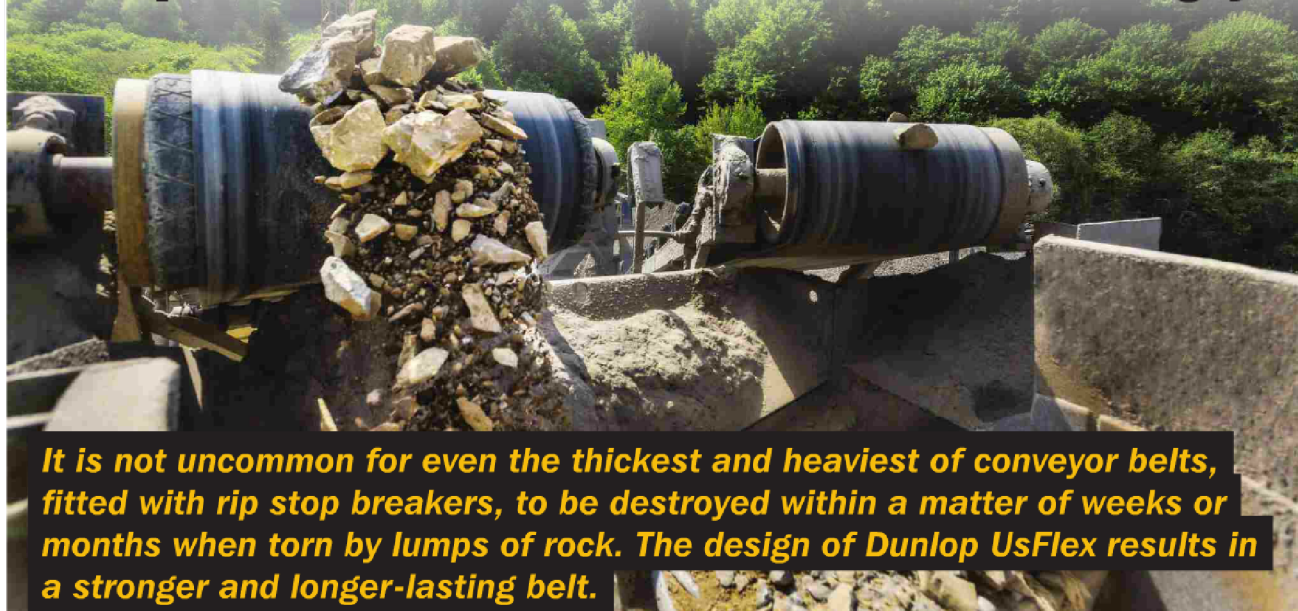




Making the most of improved belt technology



It is not uncommon for even the thickest and heaviest of conveyor belts, fitted with rip stop breakers, to be destroyed within a matter of weeks or months when torn by lumps of rock. The design of Dunlop UsFlex results in a stronger and longer-lasting belt.

When faced with the need to repeatedly repair damaged belts and, ultimately, to prematurely replace a barely worn belt, the most obvious answer would seem to be to fit an even heavier, thicker belt, which is very rarely the best solution due to the limitations in pulley diameter, or to fit 'sacrificial' belts but with all the associated issues that frequent belt changes entail.

In truth, the real answer is the same that applies to virtually all other conveyor belt problems, which is to fit belts that have a carcass that is specifically designed for the purpose and which is protected by top quality, high performance rubber covers.

Conveyor belt technology has advanced quite significantly. Today's belts, even those that carry the heaviest, hardest and sharpest materials, should be able to handle such aggressive materi-

als and yet still run for far longer than they currently do. So, the technology and the solutions are out there. You just have to know what to look for. So we asked one of the most respected names in conveyor belting, Netherlands-based Dunlop Conveyor Belting to do just that.

Here, director of development, Dr. Michiel Eijpe, dispels some of the outdated misconceptions about heavy duty belting and throws new light on a unique conveyor belt construction.

A very different approach

Our traditional market strategy at Dunlop has always been to approach the market from the opposite direction of our competitors by maximising the working life of belts. At the same time, our aim is also to dramatically reduce direct and indirect operational costs, including belt repairs and lost production time. In effect, we compete against low priced, low quality production values by using greater cost-efficiency as the buying motive for our customers.

The ultimate solution

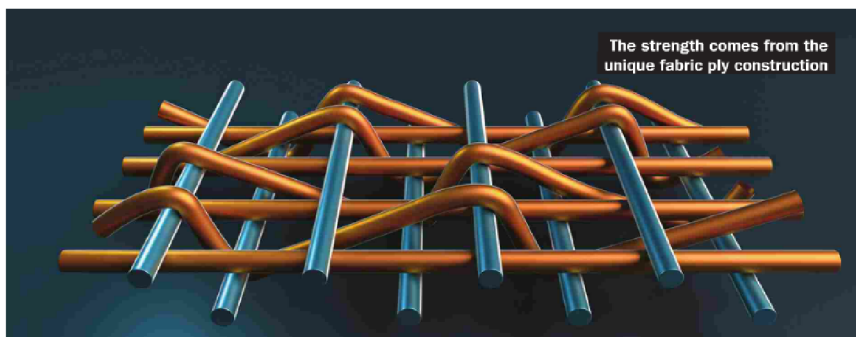
Meet Dunlop UsFlex, which has up to three times greater impact resistance and more than four times greater cutting resistance than conventional plied belting. It is even far superior to steel reinforced, solid woven and other conventional heavy-duty belt constructions of a similar tensile strength.

Belt Characteristics

The toughness of UsFlex lies within its unique carcass. Conventional wisdom would seem to dictate that increasing the number of plies will naturally result in a stronger belt. Actually, this is not the case. The greatest influence on the strength and other physical properties of a conveyor belt are the actual design and quality of the ply material used to create the carcass.

The 'secret' behind the amazing impact and tear resistance of UsFlex is the use of a unique 'straight-warp' woven fabric ply. This consists of heavy strands of polyester running lengthwise and nylon running crosswise. The strands are completely straight in both directions and not interlocked as in a conventional belt carcass. This allows the weft to float free from the warp, providing two major benefits. Firstly, the design minimises the peak point of impact because the energy is dissipated over a larger area.

Secondly, if a sharp object penetrates the carcass the nylon crosswise strands have the strength and the 'freedom' to compact (gather) together, effectively forming an increasingly stronger barrier. It is a broadly similar principle to that of a fabric rip stop breaker ply except



The strength comes from the unique fabric ply construction

significantly more effective.

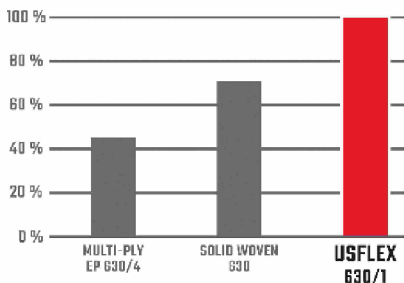
UsFlex belts are either a one or two-ply construction, from a 400/1 to a 1600/2. The two most popular versions of UsFlex are a 2-ply 1000N/mm (for heavier duty conveyor applications) and a single-ply 630N/mm, which is primarily used on machines with relatively small pulley diameters.

For some, the idea that a conveyor belt with only one or two plies could be so much stronger than a belt with multiple plies and very thick covers may not make much sense. The fact that it is genuinely much stronger is entirely due to advances in technology and design.

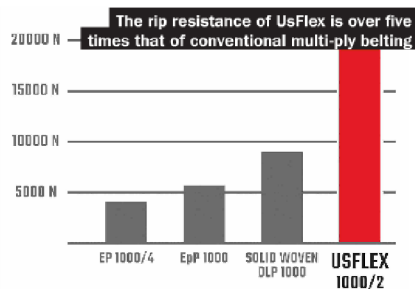
Tested to destruction

It is important to point out at this stage that the tests for impact, rip and tear resistance referred to below are only made on the actual belt carcass itself. The top and bottom covers are always removed to ensure that the thickness and quality of the rubber cover does not influence the validity and consistency of the tests.

When compared to conventional multi-ply and solid woven belting, the impact resistance of UsFlex is quite exceptional. For example, a single ply UsFlex type 630/1 has the impact absorbing qualities of a 4-ply EP belt type 1600/4 or an EPP 1250/2. The chart shows the comparable results of impact tests on 630 rated UsFlex, Solid woven and multi-ply belting.



The longitudinal ripping of a conveyor belt is caused when sharp foreign objects penetrate the moving belt and then become trapped. In laboratory tests we pierce a belt with a sharp hook and pull the belt to simulate the ripping action, the force of which is then measured. Such testing consistently shows that the rip resistance of UsFlex is over five times that of conventional multi-ply belts and far superior to Solid Woven and EpP constructions.



The invisible belt destroyer. Test sample shows serious cracking following exposure to ozone.

Added protection

Because of the extremely aggressive materials and harsh working conditions that UsFlex is designed to cope with, all UsFlex belts are fitted with Dunlop RS covers as standard. This is because RS rubber compound has excellent resilience to the cutting and gouging caused by sharp rocks combined with a resistance to abrasion that exceeds the very highest abrasion standards, which are DIN W and the equivalent ISO 'D' standard.

Because of the combined strengths of the carcass and the rubber covers, UsFlex belts with homogeneous chevron profiles have also proved to be a great success on a wide range of machines.

Ozone & UV degradation

All conveyor belts also need to have first class resistance to the effects of ozone and sunlight.

Exposure to ozone increases the acidity of carbon black surfaces and causes reactions to take place within the molecular structure of the rubber. This can have several consequences such as a surface cracking, a marked decrease in the tensile strength of the rubber and consequently a much shorter belt life. The same applies to exposure to ultra violet light.

When ordering any conveyor belt, regardless of type, my advice is to always insist on certification confirming that the belt you are ordering has successfully passed the EN/ISO 1431 test.

Life at the sharp end

One example of the effectiveness of UsFlex is a site handling in excess of one million tonnes per annum of Dolerite, which is a notoriously hard and sharp rock. The primary jaw crusher being used was processing up to 650 tons per hour of sub-250mm material that fell some two meters onto the conveyor.

New belts had been lasting as little as two months before signs of deterioration due to impact damage started to appear. Desperate for a solution, the site management agreed to fit an UsFlex 1000/2 8 + 3 conveyor belt. After carrying more than one million tonnes and

reducing the cost per ton by almost 50% the trial was unsurprisingly considered to be a complete success! Examination of the belt did reveal some cuts in the top cover rubber but most importantly there was no evidence of carcass damage. The introduction of UsFlex improved continuous production and reduced belt maintenance and downtime. After 3 years, the UsFlex belt was still operating successfully, ultimately resulting in a reduction in cost per ton of more than 80%.

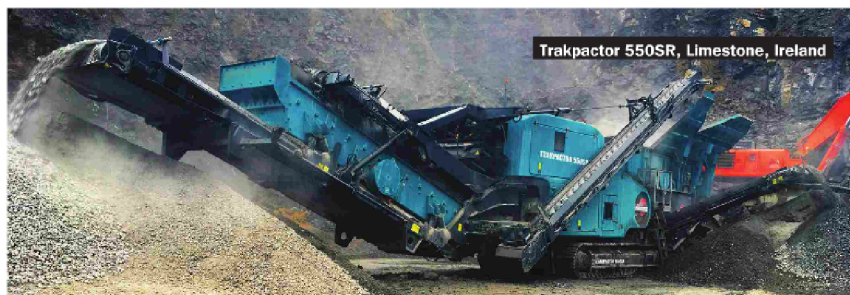
The admittedly higher initial cost is invariably repaid many times over. Hire companies especially benefit from the reduction in the frequency of repairs and replacements.

Vulcanised Splice

The weakest part of any conveyor belt is the splice joint. For maximum splice strength, we recommend finger splicing. All of the endless UsFlex belts that we supply are finger-spliced. In destructive testing a finger-splice joint achieves in excess of 90% of the belt strength at failure. This is far stronger than conventional multi-ply belting where splice strength is typically 60-70% of the breaking strain. On two-ply UsFlex belts such as the 1000/2, conventional step splicing techniques can be used. A great many of our UsFlex users also use mechanical fasteners, which is often necessitated by the need for speedy replacement and/or lack of accessibility.

Seeing is believing

C&K Fitzpatrick based in County Kildare have been a loyal distributor of Dunlop in Ireland for more than 30 years. Managing Director Mark Fitzpatrick is naturally a big fan of UsFlex but at the same time understands customer reluctance to give it a try. "Changing to a single ply or dual ply construction belt does appear to be a big step and the apparently high price does seem off-putting at first but over the years we have experienced countless real life success stories involving UsFlex belts. It really is the toughest belt I have ever seen and they just seem to run and run and run". As the old adage goes, "seeing is believing".



Trakpactor 550SR, Limestone, Ireland