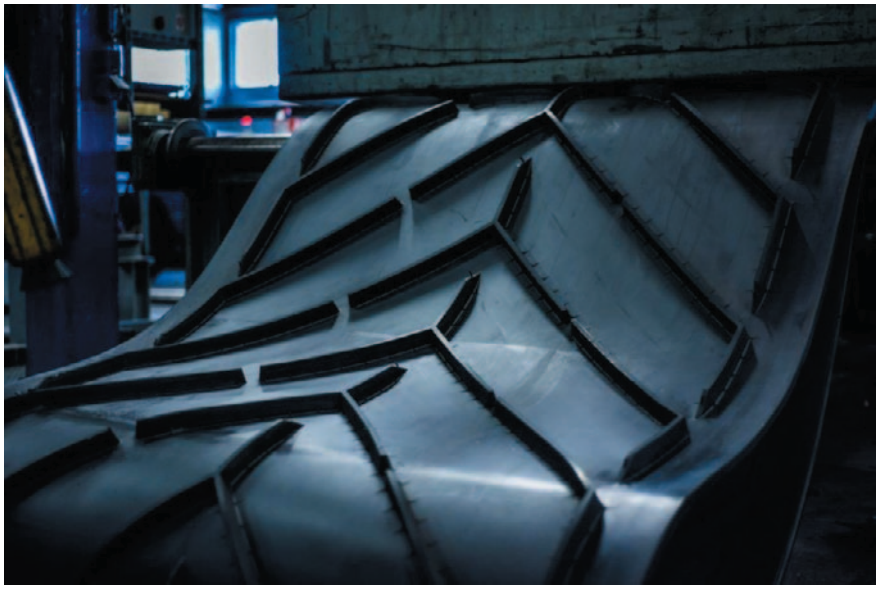
Don't let it slip: a guide to high profile chevron conveyor belts

Especially in locations where space is at a premium — as it is in bulk handling stockyards — many ports and terminals use conveyors to transport materials up and down steep inclines and gradients. When the incline is particularly steep and/or the materials being conveyed are prone to sliding or rolling back, conveyor belts with high chevron profiled surfaces are used. Despite their important role and the wide variations in maintenance, repair levels and operating lifetime, very little is known about them. Here, *leading application engineer, Rob van Oijen, explains common failings*, why they occur and how they can be avoided.



Chevron pattern profiles

The most commonly used types of profiled rubber conveyor belt are those that have chevron-patterned raised profiles, usually either 16mm, 25mm or 32mm above the base belt surface, that guide and control the flow materials such as sand, small size aggregates, grain, biomass etc.

The most frequent problems affecting high chevron belting is the profiles becoming cracked and wearing down rapidly and chevrons that become partly detached and/or ripped off entirely.

Conventional chevron belting production — the key flaws. The conventional method used to make a high profile chevron belt is for a belt carcass (known as the base belt) consisting of layers of fabric reinforcing ply and covered by uncured rubber compound on both the outer surfaces is placed in a vulcanizing press. A mould plate is filled with uncured rubber and the base belt placed on top of the mould. Alternatively, the mould plate is extracted, filled with uncured rubber and then replaced back under the base structure. In both cases, the complete structure is then vulcanized to create the finished belt.

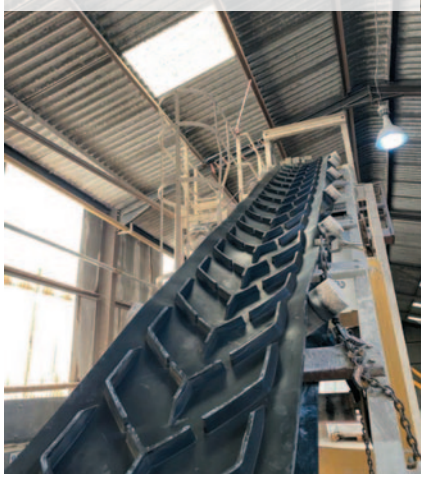


A common problem – profiles that split and eventually detach from the base belt.



Old before its time – the result of exposure to ozone and ultraviolet light.

Chevron profiled belts are designed to prevent slippage or roll back.



The first big disadvantage with this method is that the rubber used in the moulds to create the chevron profiles must be a different formulation from the rubber to make the base belt, because it needs to be much more malleable so that it will flow smoothly and uniformly into the moulds without creating air pockets. This means that the contact point (bond) where two essentially different rubber compounds are joined becomes a common point of weakness.

The chevron profiles constantly stretch and flex under tension as they run around pulleys and drums. Unless the bond between the base belt surface and the chevron profile is absolutely flawless and chemically compatible then sooner or later the profile will start to break away from the base belt.

This problem is magnified on conveyors with relatively small pulley diameters, especially mobile equipment, because smaller pulleys create higher dynamic stress. Failure will occur even sooner if the rubber compounds are not fully resistant (as per ISO 1431 testing) to the effects of degradation created by chemical reactions in the rubber caused by ground level ozone (O3) and ultraviolet light (UV).

This is because the rubber ages prematurely, hardens, cracks and therefore loses essential elasticity. To learn more, this Fenner Dunlop article in the January 2026 issue of *Dry Cargo International* explains: https://www.fennerdunlopemea.com/app/uploads/Limited-life-expectancy.-DCI-Jan26.pdf)

Shorter wear life. Having to use a more pliable, lower strength rubber to fill the mould cavities also creates other life-limiting flaws. Firstly, dynamic stress fractures cause the profile to split and

eventually break up or completely part company with the belt surface. Secondly, laboratory research and field experience has shown that standard chevron profile rubber often has much lower resistance to cutting and abrasive wear than normal. It is not unusual, especially among so-called 'economy' belts imported from South and East Asia, that even chevrons as high as 25mm or 32mm can wear flat in a remarkably short time.

Make it once, make it strong. The only one way to avoid these inherent weaknesses is the use of a single, specially engineered rubber compound that enables simultaneous vulcanization of both the base belt structure and the chevrons to produce a single, wholly homogenous belt structure using a one-step process rather than the two-step method.

It is much more difficult (and costly) to create such a versatile compound due to the high number of different chemicals, polymers and additives that are needed and which have to be precisely balanced and mixed so that the final compound possesses all the necessary physical properties. These include good wear resistance, tensile strength, durability and resistance to ozone (O_3) and ultraviolet light while at the same time having sufficient malleability to flow smoothly into the moulds.



A much lower resistance to cutting and abrasion.



A chevron profile mould vulcanizing plate. (Image courtesy of Fenner Dunlop).



A 'single structure' chevron belt needs a highly specialized rubber.

The 'one-step process' explained

A single homogenous structure profiled belt is created by placing the base belt in a vulcanizing press with a chevron mould plate immediately below it. The base belt will already have a specific quantity of additional uncured rubber on the top cover surface.

This extra rubber is in addition to the amount of rubber needed to achieve the minimum thickness of the top cover of the base belt once it has been vulcanized. The compression between the upper and lower plates forces the additional rubber to flow into the mould cavities. Simultaneous vulcanization of both the base belt structure and the rubber-filled moulds can then take place.

Because of the greater technical complexity of the process and the rubber compound, perhaps it is not surprising that apart from Fenner Dunlop Conveyor Belting in the Netherlands, hardly any other manufacturers produce profiled chevron belt in this way. The company is helped by the fact that it makes its own rubber, which is also very rare nowadays.



Rob van Oijen.

Conclusion

Understanding the advantages is one thing but being able to establish which process is actually used by the manufacturer of the belt being offered to you is not always easy. Firstly, traders and dealers are unlikely to know the answer and indeed, that different vulcanizing processes even exist! If buying direct from a manufacturer then it is better to speak to a technician rather than a salesperson.

However, the first challenge is usually discovering the true source of origin (manufacturer) and then being able to effectively and honestly communicate with them. Ultimately, the only way to find out is to ask the question and then hope that the person you are speaking to actually knows the difference.

Making profiled belts that give the best return on investment by providing the longest and least problematic working lifetime is something very few manufacturers can achieve but fortunately, they do exist. Although the short term cost is higher, the vastly superior strength, reliability and extended working life created by the single-step process invariably make it a very worthwhile investment for the buyer.