

Greening cargo operations

with the right equipment and approach, bulk operators can act as environmental stewards



Louise Dodds-Ely

Waste not, want not: why attitudes must change to protect our world

A few years ago I was travelling in Norway visiting companies that used industrial conveyor belts, writes conveyor belt specialist Leslie David. On one such visit, the conversation turned to how worn-out conveyor belts were disposed of. I still remember how shocked and saddened I felt when I was told of how rolls of used rubber belting were being secretly dropped into local fiords. I was told that the cost of

having them taken away by waste disposal companies was too expensive and recycling them was simply not a viable proposition. The environmental problems posed by used conveyor belting is accelerating at an unsustainable pace.

Everyone involved with conveyor belts, from the manufacturers to the traders to the end-users need to sit up, take notice and take action.

HUGE VOLUMES

The impact on the environment caused by discarded rubber belting is huge. And the problem is growing. Annual sales of conveyor belts in Europe alone are conservatively estimated to be in excess of €500 million. In terms of the physical volumes involved, that represents (again, very conservatively) some 15 million metres (15,000 kilometres) in length and

150,000 tonnes in weight. As I will explain a little later, the problem is rapidly being multiplied because due to changes in the market. The average working lifetime of these belts is shortening so replacement belting is having to be manufactured even more frequently than in the past.

WHAT ARE WE DEALING WITH?

Rubber constitutes at least 70% of the material mass of both multi-ply and steelcord belts. Because of its adaptability, most of the rubber used in conveyor belting is synthetic. Relatively little natural rubber is used. The most commonly used type of conveyor belt are

rubber 'multi-ply' belts. This forms some 85% of industrial conveyor belt used in Europe. This type of belt has multiple layers of polyester/nylon (EP) fabric that are used to create a sturdy carcass, which in turn is protected by a thick outer coating of rubber. Most multi-ply belting will have two to four layers of fabric. This means that some 45,000 kilometres of non-biodegradable polyester and nylon fabric is being created and ultimately discarded every single year.



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The other main type of belting in common use is steelcord belting. In this case the carcass of the belt consists of thick longitudinal cords of steel that are completely enveloped in rubber and, as with fabric multi-ply construction belts, they have a thick coating of rubber on the top and the bottom.

THE CARBON FOOTPRINT

The manufacturing processes and the raw materials used to produce heavy duty

industrial conveyor belts create a large carbon footprint. Firstly, the raw materials such as polyester/nylon fabrics and the components used to create the (mostly) synthetic rubber, are pretty much all directly or indirectly derived from crude oil. In fact a typical conveyor belt is effectively 45% oil. One tonne of scrap rubber will usually contain some 500 litres of oil.

The actual production lines used to manufacture conveyor belts are long and very slow moving. This is because the fabric layers of the belt have to be bonded together with uncured rubber before having the top and bottom outer surfaces 'coated' by layers of rubber to achieve the required thickness. The slow, highly sensitive process of hot vulcanization then takes place in huge presses. This all consumes a great deal of energy. The process remains very similar for belts reinforced with heavy steel cords rather than layers of fabric.

A CHEMICAL COCKTAIL

In order to create the synthetic rubber compounds that can cope with the many different demands placed on the rubber during use, such



Conveyor belt production lines consume a lot of energy.

as resistance to fire, oil, ozone and abrasion, it is an unavoidable fact of life that a huge range of different chemical components and substances have to be used. The same applies to a great many products used within the compound mix, of course, including everyday household products. Fortunately in Europe, the dangers are mitigated by the existence of the European Union's REACH (Registration, Evaluation and Authorisation of Chemical substances) regulation EC 1907/2006. These came into force in June 2007 and were introduced to improve the protection of human health and the environment from the risks that can be posed by chemicals used in manufacturing processes. All European manufacturers are legally obliged to register the use of "substances of very high concern" (including those believed to cause various forms of cancer) that are listed within the regulations with ECHA (European Chemical Agency).

IMPORTED DANGERS

One of the most significant market changes that I touched on earlier has been an enormous increase in the level of rubber industrial conveyor belting being imported



into Europe. By far the biggest single source of these imports are from China. Between 2017 and 2019 imports of fabric reinforced and steelcord reinforced belt from China alone grew by 48% to more than €108 million. Imported belt from Asia now represents



Manufacturers in Asia are not subject to EU regulations designed to protect the environment.

some 30% of the total conveyor belt market in Europe and it is showing no sign of slowing down.

The significance in terms of the direct threat to the environment caused by Asian imported belt is considerable. Firstly, manufacturers located outside of EU member states, including Asia of course, are not subject to REACH regulations and are therefore free to use unregulated raw materials even those materials may be prohibited or at least have strict usage limitations within the European community.

SOMETHING SMELLS WRONG

One of the biggest concerns involves short-chain chlorinated paraffin's (SCCP's) that are commonly used by Asian manufacturers to accelerate the vulcanizing process, thereby reducing their production costs and allowing them to undercut European manufacturers. REACH regulations clearly stipulate that SCCP's should either not be used at all or at least only used on a very restricted basis because of their category 2 carcinogenic classifications. They also pose a serious threat to the environment, which is why they are subject to the Persistent Organic Pollutants (POPs) Regulation in the European Union. Their presence can usually be identified by the unpleasant smell of the rubber.

AN EVEN BIGGER CARBON FOOTPRINT

The market strategy of Chinese conveyor belt manufacturers relies on being able to drastically undercut the price of European manufactured belting. Without the hindrance of the environmental controls that are in place in Europe and elsewhere, practices that pollute the environment are sadly commonplace. One such practice is the burning of used rubber car tyres to create a cheap form of carbon black. Some 20% of rubber compound is made up of carbon black so it has a notable impact on cost. Good quality carbon black is created by a process of burning oil in a strictly controlled, low oxygen environment so that combustion is incomplete. But burning used car tyres not only pollutes the atmosphere it also means that the carbon black it creates contains the potentially harmful chemicals previously contained in the tyres that will go on to form part of the conveyor belt.

These huge quantities of rubber belting are being transported by sea, which is widely recognized as being the mode of transport that has by far the highest carbon footprint. But the biggest problem associated with low grade imported belt from Asia is that it is widely accepted to be of much poorer quality; most significantly measurable in terms of its much shorter wear life. In my experience, and that of a great many others, it therefore needs to be replaced at least twice as fast as good quality, more durable belting made in Europe. So, every way you look at it from an environmental perspective, the increasing use of belting imported from Asia is very bad news all round.

LIMITED RECYCLING

As I mentioned previously, some 15,000 kilometres of highly durable, non-



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biodegradable industrial rubber conveyor belting is added to the chain each year in Europe alone. Although there are no published statistics that record the exact amount of belting that is being recycled, it is widely believed to be less than 10%. Some industry estimates put the figure as



Fewer than 10% of rubber belts are recycled.

low as 5%. Either way, it is a drop in the ocean. The opposite is true of car tyres. Newer technology, such as pyrolysis and de-vulcanization, has made tyres much more suitable targets for recycling despite their volumetric bulk and resilience. In Europe, nearly 95% of all used car tyres are now recycled. Roughly half of these 'end-of-life' tyres are used for energy, mostly in cement manufacturing and for ground rubber. There are a number of reasons for this alarming disparity.

The primary reason is that car tyres are much easier to transport, handle and feed into recycling process machinery whereas conveyor belts have a far greater density of weight and need special, heavy-duty equipment to roll and unroll them. This

also makes it an appreciably slower, more complicated process. In addition, the cost of collecting rolls of conveyor belts weighing hundreds of kilos and transporting them to a suitable recycling plant is considerably higher.

In terms of recycling, the rubber top and bottom covers can either be ground off or removed using a large, heavy-duty splitting machine. This can then be shredded and used for a variety of different purposes such as a road surfacing component (for noise reduction), driveways and even recreational areas. However, there is much less demand for the polyester and nylon fabric inner plies and certainly no practical use for the metal cables found in steelcord reinforced belts. So from the point of view of recycling companies, they would be left with large, unwieldy volumes of non-biodegradable waste that will cost them some €175 per tonne or more to dispose of as landfill. The harsh reality is that no matter how much we may care about the environment, under foreseeable market circumstances, recycling industrial conveyors is not only ecologically problematic, it simply is not financially viable.

WE CAN MAKE A DIFFERENCE!

Despite the scale and seriousness of the situation and the apparent gloomy environmental outlook, there is in fact a huge amount that can be done that could potentially halve the size of the problem. And as surprising as it may sound, these actions can be taken by individuals and companies virtually immediately.

If we can change buying policies and determine to buy better quality, longer



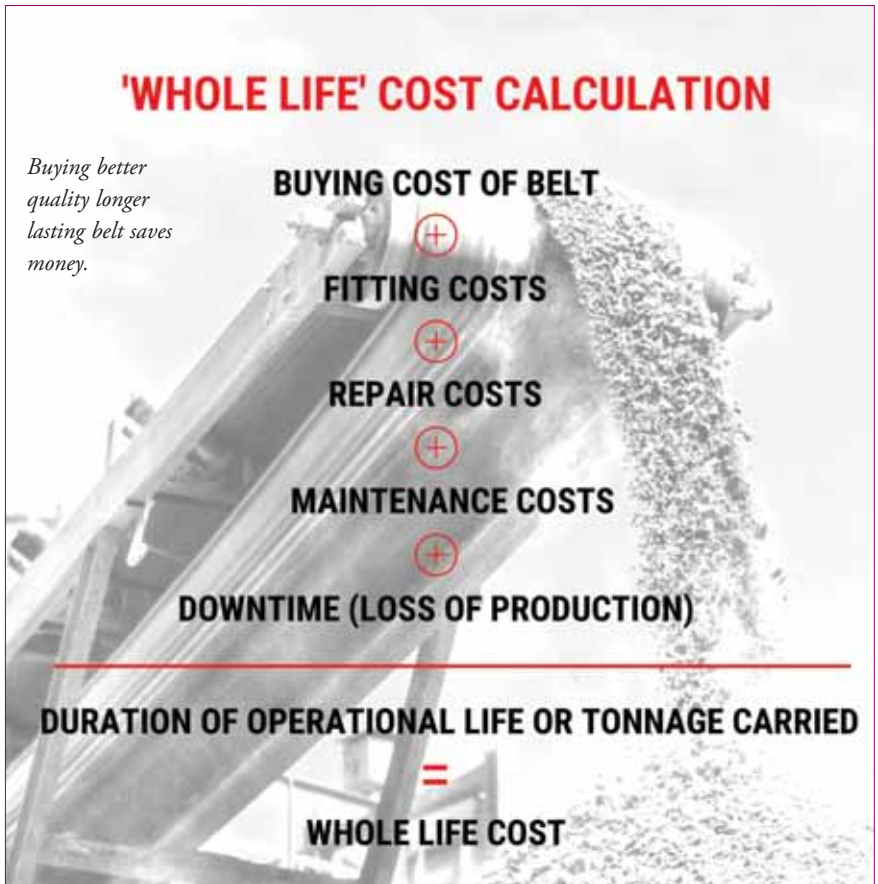
There is virtually no demand for used belt reinforcing steel cables.

lasting belt, albeit at an admittedly higher up-front price, instead of buying 'cheap' low grade belt imported from Asia then it will create some extremely significant benefits. Firstly, it will actually reduce costs for the user over the medium to long term because of the substantial reduction in 'whole life' cost. Secondly, and most importantly from an environmental impact point of view, the amount of belting that has to be manufactured in the first place to replace worn-out belting can be reduced by at least 25%.

The third action needed is for buyers and users of conveyor belts to absolutely insist that proof is provided by the belt supplier that the manufacturer has complied with REACH regulation. This will go a long way to reduce the risk of potentially harmful effects on those who physically handle the belts as well as keeping the ecological impact of releasing dangerous chemicals to an absolute minimum.

As a final addendum, I would like to think, in light of the Coronavirus pandemic, that all businesses in Europe and the West in general will now recognize the very real dangers of relying so heavily on Asia for the manufacture of so many of the vital components and supplies that we use.

If we do not control our own manufacturing processes then we will never be able to control their impact on our environment and our personal safety. We



certainly cannot say that we have not been warned.

ABOUT THE AUTHOR

After spending 23 years in logistics management, Leslie David has specialized in

conveyor belting for over 14 years. During that time, he has written numerous technical guidance features and papers and has become one of the most published authors on conveyor belt technology in Europe.