BALANCING SUSTAINABILITY AND SAVINGS

Bob Nelson, conveyor belting specialist, examines the environmental impact of conveyor belts used in the fertilizer industry, advocating for a mindset shift to reduce waste and lower the overall carbon footprint of conveyor systems.

The fertilizer industry is making huge efforts to lessen the environmental impact of its products, but can the same be said for the tools and equipment that it uses, such as on-site conveyors? This article looks at the situation from the perspective of both the manufacturer and the end-user, and demonstrates how a change of mindset could dramatically reduce the impact of tools and equipment on the environment.

The challenges

Conveyors are a very environmentally efficient method of moving vast amounts of material. At the same time, manufacturing the conveyor belts that carry those loads uses an enormous amount of energy and materials. The most commonly used type of conveyor belt is rubber 'multi-ply' belts which mostly have between 2 - 4 layers of synthetic fabric, usually a combination of polyester and nylon, which are used to create a sturdy carcass. Usually for long-haul applications, a carcass consisting of thick, strong steel cables is used. In both cases, the carcass is protected by a thick outer coating of rubber.

Because of its adaptability, most of the rubber is entirely synthetic. Very little natural rubber (NR) is used. The raw materials used to create the rubber and fabrics are almost all directly or indirectly derived from crude oil. In fact, a typical conveyor belt is effectively 45% oil. You can add to this, a vast array of different chemical components such as anti-degradants, antiozonants and accelerators.

Long-term impact

Ultimately, every conveyor belt has to be replaced and disposed of, which creates something of a double-edged sword.
For example, in Europe, nearly 95% of all used car tyres are now recycled. By comparison, the amount of redundant conveyor belting being recycled is estimated to be less than 10%. There are many reasons for this disparity. Recycling conveyor belts is an

appreciably slower, more complicated and expensive process. There is also much less demand for the polyester and nylon fabric inner plies and no practical use for the metal cables found in steel cord reinforced belts.

Figure 1. Fertilizer conveyors in action.

Figure 2. Conveyor belt rubber is almost entirely synthetic.

Figure 3. Rapid wear of conveyor rubber.

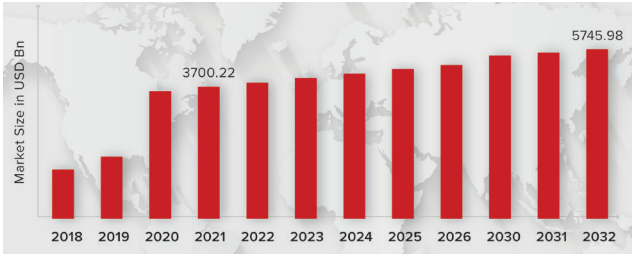

Figure 4. Rubber conveyor belt market graph.

The reality is that under foreseeable market circumstances, recycling industrial conveyor belts is both ecologically and economically problematic. As a result of this, thousands of tons of rubber, polyester, nylon and all the associated chemicals have to be disposed of, most of which goes to landfill.

A fast-growing problem

The world market for industrial conveyor belts is huge and growing fast. From a level of US$3700.22 million in 2021, it is projected to grow to US$5745.98 million by 2032, representing a compound annual growth rate (CAGR) of 4.49% during the forecast period (2023 - 2032).[1]

Although there seems to be no reliable data available to translate the monetary worth into physical volumes, the tonnages involved are undeniably mind-boggling.

Throwaway culture

With such an enormously valuable and fast-growing market, it is hardly surprising that competition amongst conveyor belt manufacturers and traders is high. Although always competitive, a more descriptive term nowadays would be 'ruthless'. An increasing number of highly respected industry experts argue that the level of competition is the root cause of the growing problem of environmental impact, declining quality standards and, in an increasing number of cases, dishonesty.

In Europe, the biggest source of rubber belting is Southeast Asia, predominately China. As with virtually every other high-value market, the strategy is based on mass volume manufacturing at a barely acceptable (and often unacceptable) standard of quality at dramatically lower prices. Over the past two decades, much of the European-based conveyor belt manufacturing capacity has disappeared as a result, creating an unhealthy reliance on low-grade imports. Although not the case with Fenner Dunlop in the Netherlands, European manufacturers often supplement their production with imported belting. What has transpired is a throwaway culture fuelled by a willingness to replace conveyor belts at a frequency that is many times higher than it should be.

Sacrificed on the price altar

Faced with their own budgetary challenges, many end-users welcome the opportunity to apparently cut costs in the short-term by buying low-priced imported belting, which can quite easily be as much as 50% (or more) cheaper than their counterparts at the opposite end of the quality scale. In many cases, quality and longevity is knowingly sacrificed on the price altar, but in just as many cases, the sacrifice is made unwittingly.

Anecdotal evidence strongly indicates that even when it becomes obvious that the low price really did reflect the quality, the opportunity to return to higher quality, more durable belts has been missed. Once the powers-that-be who set the expenditure budgets and those who work in purchasing departments see the 'savings', then those low prices become cast in stone.

Cost cutting – a price to be paid

It is important to understand how today's cut-throat prices are being achieved because this has an equally large bearing, not only on performance and longevity, but also on environmental impact. Because of the high level of automation, labour costs account for as little as 5% of the production cost. The real reason for the enormous differences in price is that raw materials can make up to

70% of the cost of producing a conveyor belt. Consequently, the only way to manufacture a low-price belt is to use low-price (low grade), unregulated raw materials. Cost-cutting practices include using cheap, low-grade polymers and chemical ingredients, the use of 'bulking fillers' such as clay and chalk, and using low-grade synthetic fabric plies. Another practice is the total omission of essential ingredients, such as the antiozonants that prevent premature rubber degradation caused by exposure to ozone (O_3) and ultraviolet light (UV). These are important ingredients to minimise premature ageing effects.

To summarise, the environmental challenges associated with rubber industrial conveyor belts are considerable. Fortunately, it is not a lost cause because a lot of positive actions have been, and are being, taken by some manufacturers. However, for these actions to bear fruit, much more understanding, coupled with a change of mindset, is needed from those who are responsible for buying conveyor belts.

Meeting the environmental and economic challenges

The environmental impact of our products

It is an inescapable fact that to make some rubber compounds it is necessary to use some chemicals that are dangerous in their own right and which can potentially have a lasting impact on the environment. Fortunately, at least as far as Europe is concerned, very strong regulatory controls are in place that are designed to protect humans, wildlife and the environment in the form of REACH (registration, evaluation and authorisation of chemical substances) regulation EC 1907/2006 and EU Regulation No. 2019/1021. persistent organic pollutants (POPs).

Worryingly, many European manufacturers have chosen to ignore this because of the impact on production costs. Manufacturers located outside of EU member states and the UK are not subject to them at all, leaving them free to use much cheaper, unregulated raw materials even though they may be prohibited or at least have strict usage limitations within Europe.

Advice is therefore to always ask for written confirmation from the manufacturer or supplier of the belt you are buying that it has been produced in compliance with REACH EC 1907/2006 and EU Regulation No. 2019/1021 POPs regulations.

Product life cycle

The amount of conveyor belting used (and discarded) represents the single biggest influence on the industry's carbon footprint. It also represents the biggest opportunity for every user of conveyor belting to contribute to reducing that carbon footprint.

As previously explained, the materials used to make conveyor belts are almost entirely synthetic. Almost all are directly or indirectly derived from oil. Adding to this is the fact that many chemical agents are used to create the rubber. Ultimately, up to 90% of these materials, in the form of worn-out, damaged conveyor belts, will not be recycled. This is the reason why producing and using conveyor belts that have the longest possible working life is now more important than ever.

Increase the life, reduce the waste

Good quality belts, especially those made in Europe, North America and Australia, can quite easily achieve double the lifetime, compared to the 'economy' versions of what claim to be made to the exact same specification, and have a working life that lasts up to five times longer compared to low-grade imported belts. Fortunately, and rather ironically, often the best way to predict performance and longevity is the price itself, because it invariably reflects the difference in performance that can be expected.

Figure 5. Conveyor belting falling apart – sacrificed on the price altar.

Figure 6. The amount of conveyor belting used and discarded each year represents the biggest influence on the industry's carbon footprint.

Buying a better quality, longer lasting belt (albeit at a higher up-front price), instead of an 'economy' low grade belt, creates two extremely significant benefits. Firstly, it dramatically reduces the amount of belting that needs to be manufactured in the first place. This excess was simply to replace worn-out, damaged belting, along with a corresponding reduction in the amount of chemicals and additives used to create that rubber, together with a dramatic reduction in the amount of non-biodegradable synthetic fabric. Secondly, it also reduces the 'whole life' cost of conveyor belts due to the substantial reduction in repairs, stoppages, replacements and lost production. To achieve these goals, it is advisable to base your conveyor belt purchasing policy on lowest lifetime cost. WF

Reference

1. Rubber conveyorbelts market overiew: https://www.marketresearchfuture.com/reports/rubber-conveyor-belts-market