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*The world's leading and only monthly magazine for the dry bulk industry*

# What goes on below the belt

## conveyor systems and technologies



### In our hands

Never before have the environmental issues facing the world presented a greater challenge or held such a dramatically high profile. It is widely accepted that action urgently needs to be taken by the biggest industrialized nations to slow the global warming process but what contribution can we make personally? Here, *Andries Smilda, a director of Netherlands-based Dunlop Conveyor Belting*, looks at the issues facing everyone involved in the conveyor belt industry and the part we can play in helping to prevent catastrophe.

#### WE ALL HAVE A PART TO PLAY

There has been enormous media interest surrounding the United Nations COP 26 meeting held in the UK in November last year. Hopefully, it is a sign that most world



leaders are at long last starting to take the threats posed by climate change to the future of our planet and our way of life seriously. However, such is the scale of the problem that a concerted and genuine effort is needed, not only by world leaders but also by every industry, company and individual. In other words, we all have a part to play.

I passionately believe that each and every one of us has a responsibility to do whatever we can, not only for the benefit of the present generation but also the generations to come. It is not for me to preach about what we do in our private lives to protect the environment. However, in our working lives we all have varying levels of influence. I am proud to say that several years before it became 'fashionable' from a company image point of view, we made a conscious decision in Dunlop to pursue environmentally friendly strategies. This focused on three key areas; product life cycle, the environmental impact of our products and our production processes.

### PRODUCT LIFE CYCLE

There is no denying that manufacturing industrial conveyor belts uses a lot of energy and materials. Consequently, it produces a big carbon footprint. The impact on the environment caused by discarded industrial 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, again very conservatively, that represents some 150,000 tonnes in weight. The amount of conveyor belting we use (and discard) represents the single biggest influence on the industry's carbon footprint. Consequently, it also represents the single biggest opportunity where every single user of conveyor belting can make a contribution to reducing that carbon footprint. And every little bit helps as they say. To fully appreciate why the length of the life cycle of rubber conveyor belts is so



*The amount of conveyor belting we use and discard represents the biggest influence on the industry's carbon footprint.*

*Every industry, company and individual has a part to play.*



important it is first necessary to understand the background. 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 (NR) is used, which is important because natural rubber production from the rubber tree (*Hevea brasiliensis*) is expected to be the leading cause of deforestation in mainland Southeast Asia in the near future.

The most commonly used type of conveyor belt are rubber 'multi-ply' belts, which make up 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. This, in turn, is protected by a thick outer coating of rubber. Most multi-ply belting will have between 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 year, which is more than the circumference of our planet.

The raw materials such as polyester/nylon fabrics and the components used to create 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.

In Europe, nearly 95% of all used car tyres are now recycled. By comparison, the amount of used conveyor belting being recycled is believed 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 certainly no practical use for the metal cables found in steelcord reinforced belts.

No matter how much we would like it

to be different, the harsh reality is that under foreseeable market circumstances, recycling industrial conveyors is not only ecologically problematic, it is also not viable. This is precisely the reason why producing conveyor belts that have the longest possible working life is now more important than ever before.

### INCREASE THE LIFE, REDUCE THE WASTE

To be honest, from an environmental point of view it was a happy coincidence that historically, our company's approach to the market has always been to supply conveyor belts that provide a much longer operational lifetime than those of our competitors. Quite typically, this can be double the usual lifetime. In the case of imported belt we can easily be looking at three or four times longer.

On this basis, the amount of belting that needs to be manufactured simply to replace worn-out belting could be reduced by up to 50%. This also means that the amount of belting that has to be discarded could also be halved.

The impact this could have on the environment is truly amazing because it represents some 75,000 tonnes of conveyor belting that would not need to be made and transported thousands of kilometres each year. It would also mean that some 75,000 tonnes of rubber, polyester, nylon and all the associated chemicals would not have to be disposed of, most of which would be buried in the ground.

### A FRIGHTENING STATISTIC

The average modern day container ship produces the equivalent of 16.14 grams of CO<sub>2</sub> per metric tonne of goods shipped per kilometre. The average distance between Asia and Europe is in excess of 6,000 kilometres. This therefore means that some 100 kilos of CO<sub>2</sub> is emitted into the atmosphere for every tonne of imported conveyor belt.



## What can you do?

**ANSWER:** Adopt a policy of buying belts that have been manufactured as physically close to your operation as possible.

If we can persuade people to buy better quality, longer lasting belt, albeit at a higher up-front price, instead of buying 'economy' low-grade belt, then it will create two extremely significant benefits. Not only will it be an enormous help environmentally, it will also reduce medium to long-term cost for the user due to the substantial reduction in 'whole life' cost. 'Everyone wins' as they say!



## What can you do?

**ANSWER:** Base your conveyor belt purchasing policy on lowest lifetime cost.

### THE ENVIRONMENTAL IMPACT OF OUR PRODUCTS

The second aspect that we focus on in Dunlop are the chemicals and ingredients used to create rubber and the lasting environmental impact that they could have on the environment, both in the short term and in the future. There are literally hundreds of different chemical components such as anti-degradants, anti-ozonants and accelerators.

These include primary amine-based sulfenamides such as N-cyclohexyl-2-benzothiazole sulfenamide, and thiazoles, such as 2-mercaptobenzothiazole. It is an inescapable fact that to make some rubber compounds it is necessary to use chemicals that are extremely dangerous in their own right. Fortunately for us all, at least as far as Europe is concerned, control mechanisms are already in place because there are very strong regulations designed to protect humans, wildlife and the environment in the form of REACH.

### WHAT IS REACH?

REACH was established by members of the EU with the specific aim to improve the protection of human health and the



*Less than 10% of rubber belts are recycled.*

environment through the better and earlier identification of the properties of chemical substances. To briefly explain, REACH Regulation places direct responsibility on industry to manage the risks from chemicals and to provide safety information. Manufacturers and importers are required by law to gather information on the properties of the chemical substances they use and register the information in a central database in the European Chemicals Agency (ECHA) based in Helsinki.

The Regulation also calls for the progressive substitution of 'substances of very high concern' (SVHCs) when suitable alternatives have been identified, which is a really positive and progressive thing. What I also find positive is that REACH regulations regarding SVHC have become increasingly stringent and demanding. For example, Article 31 of REACH (requirements for safety datasheets) demands that if a product contains SVHC that is more than 0.1% of the total weight of the finished product then the manufacturer is

compelled to both register its use with the European Chemicals Agency and provide their customer with a safety datasheet.

Because we manufacture our own rubber and make every belt ourselves it makes it easier for us to comply with these stipulations compared most other belt manufacturers because we have full control over everything that we do.

### ACCOUNTABILITY AND RESPONSIBILITY

As far as I am aware, Dunlop Conveyor Belting was the first major manufacturer of conveyor belts to achieve REACH compliance. Sadly, many European conveyor belt manufacturers have chosen to ignore the legal requirements of REACH, either completely or at least partially because of the impact on production costs.

What worries me most of all is that the majority of belt used in Europe nowadays is imported so it is virtually impossible to know how much SVHC and Persistent Organic Pollutants (POPs) such belts contain. Manufacturers located outside of



*SVHC – Substances of very high concern.*

*The combined weight of SVHC should not exceed 0.1% of the actual product weight.*



*Non-European manufacturers are free to use unregulated raw materials including those that contain Persistent Organic Pollutants (POPs).*

EU member states and the UK are not subject to REACH regulations or even to EU regulation concerning the use of Persistent Organic Pollutants. This means that they are free to use unregulated raw materials even though those same materials may be entirely prohibited or at least have strict usage limitations within Europe.



### What can you do?

**ANSWER:** 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 regulations. It really is as simple as that.

### PRODUCTION PROCESSES

As I have already mentioned, manufacturing industrial conveyor belts uses a lot of energy and raw materials and therefore produces a large carbon footprint. Having worked in the industry for more than 30 years I cannot deny the fact that reducing the size of that carbon footprint by any significant amount in the short term is extremely challenging. Fortunately, there are things that can be done.

### MORE EFFICIENT MACHINERY

The production process used to manufacture rubber industrial conveyor belts has not changed fundamentally for a great many years. Consequently, much of the machinery is old and not always as

energy efficient as it could be. Particularly during the past decade, we have invested many millions of euros replacing outdated machines and building new production lines using the most technically advanced equipment available. I have to admit that we have had an added incentive because anything that reduces our carbon footprint by increasing efficiency also improves the overall efficiency of our business. Our steelcord production line is a good example of this because it combines what were previously separate production stages into one smooth process. Apart from the product quality benefits, this also means that it uses less energy.

### WHEN LESS IS MORE

The demands being placed on modern day conveyor belts, especially those used in 'heavy industry' such as quarrying, mining, wood and waste for example, mean that belts have to be stronger and tougher than ever before. Traditionally, this has meant making belts with multiple plies so they are becoming increasingly heavy. Naturally, thicker, heavier conveyor belts contain a lot

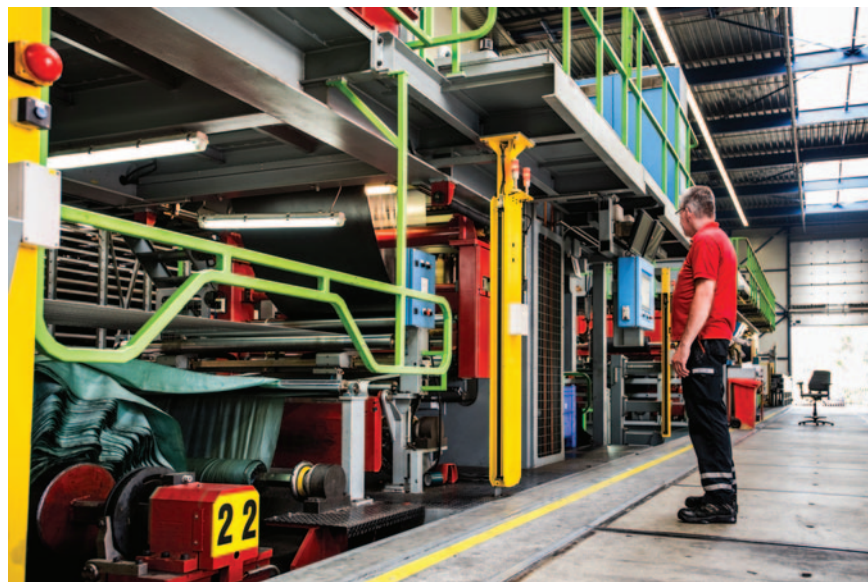
more rubber and fabric. There is therefore a parallel increase in the carbon footprint and ultimately, an increase in potentially unrecycled waste. However, at Dunlop we believe that this upward trajectory is avoidable. In fact, we do not just believe it — we know it!

### THE HOLY GRAIL?

Despite increasingly thicker, heavier belts being used, it is estimated that up to 80% of conveyor belts are scrapped prematurely due to accidental damage. The challenge presented to the Dunlop R & D team therefore consisted of two key objectives. Firstly, to design a belt that was much more capable of resisting impact, ripping and tearing. Secondly, the belt also needed to be competitive in the market, which might well be regarded by the conveyor belt industry as the equivalent of looking for the Holy Grail.

Ironically, our engineers found that the answer to the pricing issue lay in the volume of raw materials needed and the complexity of the production process.

Because we had already developed



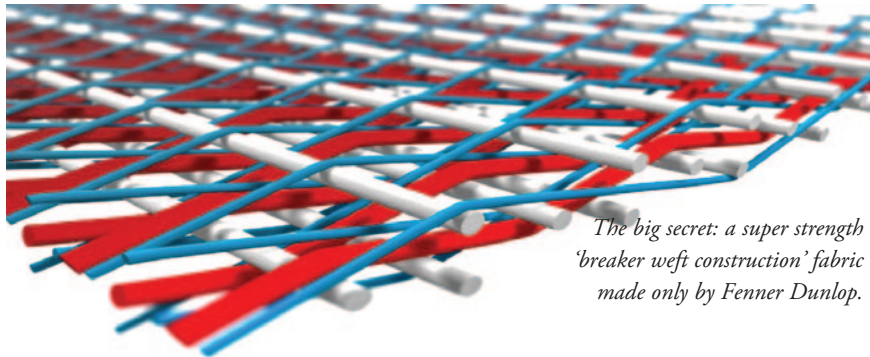
extremely hard-wearing, long lasting rubber cover compounds, our engineers and technicians went back to the drawing board and concentrated on the carcass construction.

Instead of persisting with the multiple ply carcass construction they created a single ply carcass using an amazingly tough patented fabric that is exclusively made in our sister company's in-house fabric weaving facility in the USA. The specially woven fabric uses crimped warp polyester yarns to provide high strength and low stretch combined with strong 'binder' and 'filler' yarns to create strength and stability under load. The result was Dunlop Ultra X, a unique single-ply, super-strength belt that has more than three times greater longitudinal rip resistance, up to five times better tear resistance and a far superior resistance to impact compared to traditional three-ply or even four-ply belting.

From a production point of view, having a single-ply construction helps to maximize efficiency because there are fewer calender runs. Another advantage is that having no rubber skim between the plies not only results in a thinner, stronger carcass that is less prone to delamination, it also reduces the amount of rubber needed, thereby keeping the cost down. Yet another advantage was the ability to make longer production runs at maximum width, which further maximizes production efficiency and minimizes the amount of energy consumed.

### SINGLE PLY CONVEYOR BELTS – THE WAY FORWARD

In Dunlop we sincerely believe that the development of a single ply conveyor belt



*The big secret: a super strength 'breaker weft construction' fabric made only by Fenner Dunlop.*

that not only significantly out-performs its thicker, heavier, multi-ply counterparts but also have dramatically reduced carbon footprint is a genuine and very exciting game changer.

Although some might throw their hands up at the very thought of using a single ply belt, it should be remembered that single ply solid woven belting has been used in underground mines for several decades. I am not advocating single ply belts simply because we already have a belt that can do all these things because there is nothing to prevent other conveyor belt manufacturers from following the same path. However, the fact is that replacing thick, multi-ply belts with single ply belts that are much more durable and long lasting yet use much less energy is certainly the best way forward in every respect.



### What can you do?

**ANSWER:** *The first step is to accept that thicker, heavier belts are not the solution for conveyors where belt damage is a problem. As you no doubt expect, I am naturally going to recommend that you explore the possibility of*

*using a single-ply construction belt that provides the necessary tensile strength and resistance to accidental damage. At the very least, fit conveyor belts that have been specifically engineered for the purpose rather than a constant stream of low grade 'sacrificial' belts. This will lead to extended operational lifetimes and consequently less waste in every respect.*

### IN OUR HANDS

Please trust me when I say that the actions I am proposing are not simply some kind of theoretical dream. To my mind, every individual and company has a responsibility to do whatever possible to prevent even more damage being done to our environment. The problems facing our planet today will become even more serious for our children and our children's children. Their future is in our hands. Thank you.

### ABOUT THE AUTHOR

Andries Smilda is Sales & Marketing Director of Dunlop Conveyor Belting in The Netherlands. After completing his studies in Chemical Technology in 1984, Andries joined Dunlop Conveyor Belting, where he has worked ever since and has become one of the most experienced and highly regarded senior managers in the conveyor belt industry.



*The way forward – single ply belts that are superior to traditional multi-ply in every respect.*

