A BIGGER PRICE TO PAY

Leslie David, Conveyor Belt Specialist, illustrates how seemingly identical specifications of conveyor belts can differ in price from one producer to another, and why there is invariably a much bigger price to pay in the longer term.

In the highly competitive world of industrial conveyor belting, building a brand name that has an automatic reputation for quality and performance, and that withstands the test of time, takes many years. It is something that can only be achieved by consistently producing belts with high quality standards. The downside to that, of course, is the need to charge higher prices compared to those who compete on price rather than quality. Achieving success in the face of the unrelenting downward price pressure, caused by unbranded imported belting, is an enormous challenge. The biggest single source of belting imported into Europe is from Southeast Asia, with the vast bulk coming from China. As with virtually every other market, the strategy being used is based on mass volume manufacturing at a reduced (and often unacceptable) standard of quality, at hugely subsidised prices.

Mining companies, as with all users of industrial conveyor belts, will no doubt feel that they are the beneficiaries of the ongoing price war, but is that really the case? Apart from the quality, safety, environmental and 'lifetime cost' issues, the growing dominance of imported belting means that much of the European-based conveyor belt manufacturing capacity is disappearing. This unhealthy reliance on low-grade imports has also led to reduced options for mine operators who genuinely need to use high-grade, super-tough belting for their most

demanding applications. The same applies where fire safety is paramount, because these types of 'specialist' conveyor belts are of little to no interest when it comes to mass manufacturing.

Architects of their own downfall

Amazingly, with few exceptions, European manufacturers are now supplementing their production with imported belting. Ironically, their efforts in trying to satisfy the low price end of the market may well result in their own demise. One exception is Netherlands-based Dunlop Conveyor Belting, which has continued to prosper while holding steadfast to an unwavering market strategy of selling premier quality belts that are exclusively manufactured in its own facilities in Europe. The unique selling proposition that the company uses, in the face of the extremely low prices being offered by Asian manufacturers and their importers, is one of 'lowest lifetime cost.'

To support its arguments, Dunlop provides a wealth of technical evidence based on laboratory testing and real-life examples, such as numerous case studies that demonstrate how its belts can quite easily last for up to four or five times longer than low grade imported belts. To understand the technical reasons why there is such a vast difference in longevity and performance, it is first necessary to understand the methods used by manufacturers in Asia that enable them to offer prices that, for apparently similar specification products, are so much lower than their European-based competitors.

Common misconception

It is a common misconception that products imported from Asia are of a similar quality, but cost less simply because labour costs are much lower. The reality is that the very high level of automation nowadays means that labour costs do not make a significant difference to the ultimate selling price. As a rule, labour represents approximately 10% of total costs, whereas the materials used to make a conveyor belt can constitute up to 70% of total costs. These raw materials are all available on the global market, and, as with just about any product, price ultimately determines the quality. Logically, this means that if there is a big difference in price then there must be a comparable difference in the quality of the materials used.

For conveyor belts, it is the quality of the rubber covers, in particular their ability to resist wear and tear, that has the biggest influence on their durability and operational lifetime. Rubber usually forms at least 70% of the volume mass of a conveyor belt, and more than 50% of the cost. It is therefore the single biggest cost-cutting opportunity.

Because of its adaptability, most of the rubber used to make conveyor belts is synthetic. Dozens of different chemical components and substances are used to create the numerous synthetic rubber compounds needed to cope with a conveyor's operational demands. These chemical components and additives are often very costly, so a combination of using low-grade chemicals at the absolute minimum levels or, in some cases, not using them at all, contributes towards a manufacturer's 'lowest possible price' objective.

Convenient omissions

Perhaps the best example of 'convenient omissions' concerns ozone and ultra violet light. From a product longevity point of view, there is no question that all rubber conveyor belts need to be fully resistant to the damaging effects of ozone and ultra violet light. At low altitude, ozone becomes a pollutant, and exposure to it is inescapable. The ozone increases the acidity of carbon black surfaces, and causes reactions to take place within the molecular structure of the rubber. This has several consequences, such as surface cracking and a marked decrease in the tensile strength of the rubber.

Likewise, ultraviolet light from sunlight and fluorescent lighting also accelerates deterioration, because it produces photochemical reactions that promote the oxidation of the surface of the rubber, which results in a loss of mechanical strength. Once again, laboratory testing consistently reveals that belting imported from China and Asia in general is very rarely, if ever, ozone and UV resistant. This is almost certainly because the anti-ozonants that should be used during the mixing process of the rubber compounds are viewed as an avoidable cost.

Low cost components

A key component in every black rubber conveyor belt is carbon black. It makes up approximately 20% of a typical rubber compound, and, as a result, is yet another target for those aiming to minimise production costs. The important role that carbon black plays should not be under-estimated. For example, it prolongs belt life by helping to conduct heat away from the surface area of the belt, thereby reducing thermal damage, which in turn helps to slow the ageing process. It also acts as a reinforcing compound. Belts offered with significantly lower prices are therefore likely to contain carbon black that is of a much lower quality, which has been produced at a lower cost. For example, by burning scrap car tyres, which is a practice that, unsurprisingly, does not have the hindrance of needing to comply with environmental regulations.

Other methods used to minimise rubber costs include the use of recycled rubber of questionable origin and cheap 'bulking' fillers, such as chalk, which are used to replace part of otherwise more expensive rubber polymers.

What the eye does not see

Although the rubber is the primary target, the inner fabric plies also provide a big opportunity for cutting corners. The most commonly used fabrics consist of a combination of polyester and nylon. Although two belts may have the same basic specification, there are often huge differences in the quality of the fabric plies, because the more costly nylon transversal weft material has been kept to a minimum, with preference going to the much cheaper polyester material. Although the belt may meet the required tensile strength, the lack of nylon means that rip and tear resistance, usually an important aspect of belts used in mining, is noticeably reduced. The elongation (elasticity) of the belt can also be too low, which often results in splice joint problems.

Various laboratory tests carried out on belts imported from Asia have frequently confirmed more blatant deception. These involve the use of totally polyester (EE) fabric plies in a carcass that has been sold as having the much more common polyester/nylon mix (EP) carcass construction. The whole basis of using fabrics that contain a mix of polyester and nylon fabric is that it has the best balance of mechanical properties,

including allowing a conveyor belt to run straight and true; to trough; to flex round pulleys and drums; to stretch; to provide sufficient transversal rigidity and longitudinal strength; and much more.

The use of totally EE fabric compromises a whole range of essential mechanical properties. However, the biggest danger is that a polyester weft can cause low transverse elasticity, which reduces both the troughability and impact resistance of the belt, as well as causing tracking issues. In addition, less weft in the belt can also reduce rip resistance, fastener strength, and the ability to handle smaller pulley sizes. The seriousness of the detrimental physical effects should never be under-estimated.

Figure 1. Cost-cutting opportunity – rubber represents 70% of the volume and 50% of the cost.

Figure 2. Lower-grade carbon black can be produced cheaply by burning scrap car tyres.

Figure 3. Not what they seem: The use of totally polyester (EE) fabric instead of polyester/nylon mix (EP) in order to cut costs can cause significant problems.

The fabric plies are a major cost component in any multiple ply conveyor belt. However, EE fabrics cost around 30% less than EP, so using cheaper polyester fabric is a big help when trying to achieve the perception of a lower 'like for like' price.[1] As far as the manufacturer using these tactics is concerned, they know that it is highly unlikely that the end-user will ever have laboratory tests carried out to verify the fabric's composition.

Not made to last

The combined effect of all of these cost-cutting actions is the considerably shorter operational lifetime that the end-product will provide. Unfortunately, the more imported low-grade belts that are used, the lower the level of expectation. Some operators argue that regardless of the quality, a more expensive belt is still just as likely to be destroyed by accidental damage, such as rock becoming trapped and ripping the belt from end to end. Up to a point this is true, because accidents can happen. However, evidence and experience shows that – especially in the case of specialist rip, tear, and impact resistant belts – good quality belts can quite easily last as much as five times longer than what are often termed as 'sacrificial' belts.

On a more positive note, there are signs that the tide may be turning. A growing number of mining and quarrying operations have experienced significant increases in productivity, as a result of moving away from the short-term 'sacrificial route' and installing high performance European-made belting. In one case in France, an 87% increase in output was reported. Another operation in the UK, where the maximum hourly output had been approximately 170 tph, normally less in the winter, saw output increase to over 200 tph all year round. The site is now delivering over 50% more than the contracted volume. One of the biggest factors in these increases was a massive reduction in unplanned stoppages, previously caused by the need to repair rips, tears, and broken splice joints.

The impact on the environment

Aside from the technical and 'whole life cost' shortcomings, consideration also needs to be given to the impact on the environment, which is of growing concern. For example, manufacturers based outside of the EU and the UK are not subject to environmental regulations, such as REACH regulation, or EU regulations concerning the use of potentially hazardous chemicals that are a threat to human health and the environment. This includes those that may have Category 2 carcinogenic classifications, as well as persistent organic pollutants (POPs). This means that non-European manufacturers are free to use unregulated raw materials that cost much less on the global market, compared to their regulated counterparts, even though those materials may be entirely prohibited, or at least have strict usage limitations within Europe.

One of the biggest concerns involves short-chain chlorinated paraffins (SCCPs). These are commonly used by manufacturers in Asia to artificially accelerate the vulcanisation process. REACH regulations clearly stipulate that SCCPs should either not be used at all, or at least only be used on a very restricted basis. This is because they are 'persistent organic pollutants' that are bioaccumulative in humans and wildlife, as well as toxic to

aquatic organisms, even at low concentrations.[2] These chemicals pose hazards to human health and the environment because they have Category 2 carcinogenic classifications, as referred to earlier. The clue to their presence can often be a strong, pungent aroma, whereas good quality rubber usually has very little smell at all. The formation of nitrosamine gasses is another concern, and is known to occur when certain types of vulcanisation accelerators are used. Nitrosamine gasses gradually release themselves from rubber belts, which could be a problem if the belts are stored indoors. Nitrosamines are chemical compounds classified as probable human carcinogens, based on animal studies. Investigative research is still ongoing, but publicly available information from the rubber industry (primarily from within Germany and the Netherlands) indicates that nitrosamine formation can be avoided if the accelerators are replaced by others that do not contain nitrosatable substances.

Alarm bells

If there is a significant difference in price, then the alarm bells should start to ring. This is because the methods used to create the illusion of a big saving will almost certainly result in expensive stoppages, repeated repairs, and ultimately premature replacement of the complete belt. Logically, conveyor belts that provide a much longer, trouble-free operational life are not good business for the intermediaries who supply, repair, and replace them. In fact, it could reasonably be argued that conveyor companies that provide maintenance and vulcanisation services are effectively being 'rewarded' for each repair and prematurely replaced conveyor belt. As the old saying goes, "the price is what you pay, but the cost is what you spend." Certainly, in the case of low-grade imported belting, at the end of the day, there is a much bigger price to pay. GMR

Figure 4. Good quality 'REACH compliant' rubber usually has very little smell at all.

Notes

1. The use of fabrics made entirely of polyester (EE) has its place in certain belt types and constructions, such as those used in saw mills, for example. However, in those cases, the declared specification of the belt should clearly be EE and not EP.
2. Bioaccumulation occurs when an organism absorbs a substance at a rate faster than it is naturally lost or eliminated by the organism.