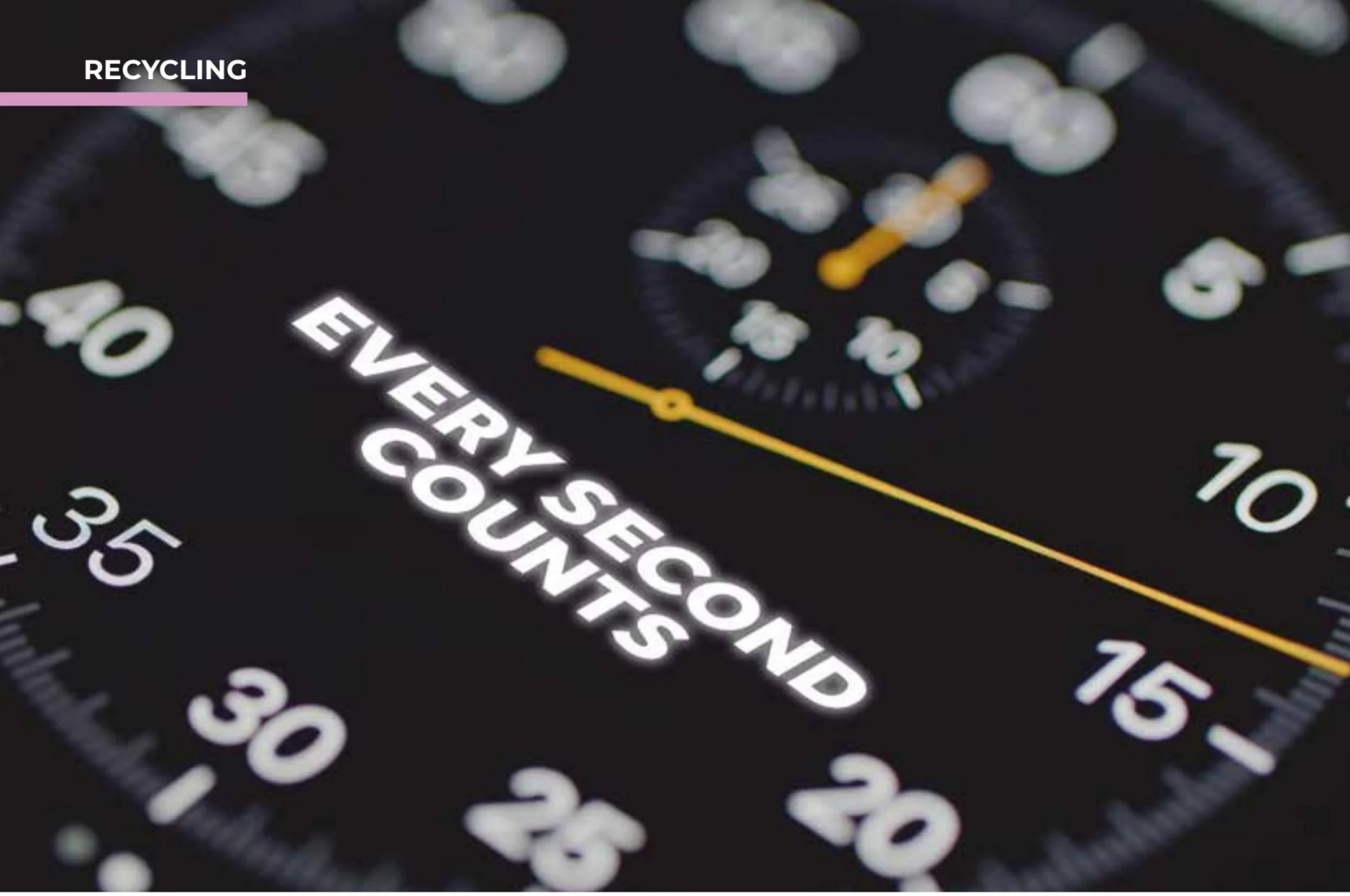


NO TIME TO WASTE

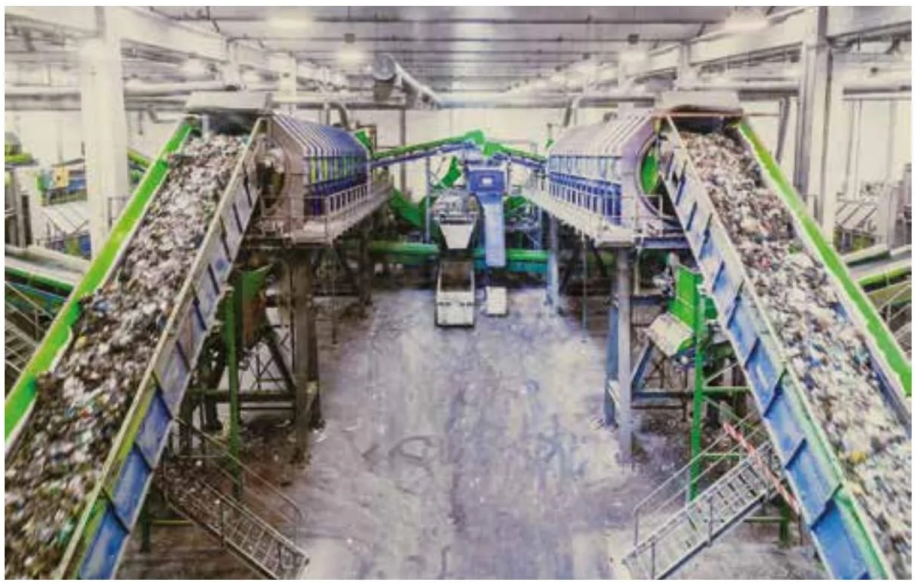
Conveyor belt specialist **Bob Nelson** provides us with an analysis of causes, costs and solutions for recycling stoppages

When a conveyor has to be stopped to carry out running repairs or unplanned maintenance, the materials being transhipped stop moving but the costs most certainly do not. In fact, quite the opposite, not only in terms of the remedial work itself but even more significantly, the cost of lost throughput. Conveyor stoppages in the waste recycling industry as a result of problems with either the conveyor belt or the conveyor itself are hugely expensive. In this special feature, Bob Nelson explains how stoppages can be minimised and, in a great many cases, avoided entirely.

A CHALLENGING BUSINESS

Recycling and waste processing is a challenging business at the best of times, especially with ever-increasing demands for better waste-type segregation and safety. At the same time, price pressure and inflation create an increasingly difficult economic backdrop. Efficiency is crucial and to be truly efficient means that waste needs must be processed, sorted and separated and channeled extremely quickly and with as few interruptions as possible.

Against a difficult economic backdrop, efficiency is crucial



UNPLANNED DOWNTIME

Conveyor stoppages disrupt the entire workflow; productivity stops, leaving the workforce in limbo while emergency repairs such as patches and clipping rips and tears are carried out. Maintenance becomes reactive rather than proactive, which places increased strain on both equipment and staff. Repeated stoppages also drive-up operational costs including call-out charges and the cost of replacement components from rollers to complete conveyor belts.

THE FALSE ECONOMY OF 'GOOD ENOUGH' COMPONENTS

Faced with repeated component failure, a great many recycling and waste plants choose cheaper, lower-quality components to reduce outlay.

Whatever the reason, placing a higher importance on the headline price of a component rather than its whole life cost is invariably a false economy in more ways than one. Apparent savings are quickly lost in unexpected failures, frequent repairs, and premature replacement. The two components that most commonly cause stoppages are rollers/idlers and the conveyor belts themselves.

ROLLERS/IDLERS

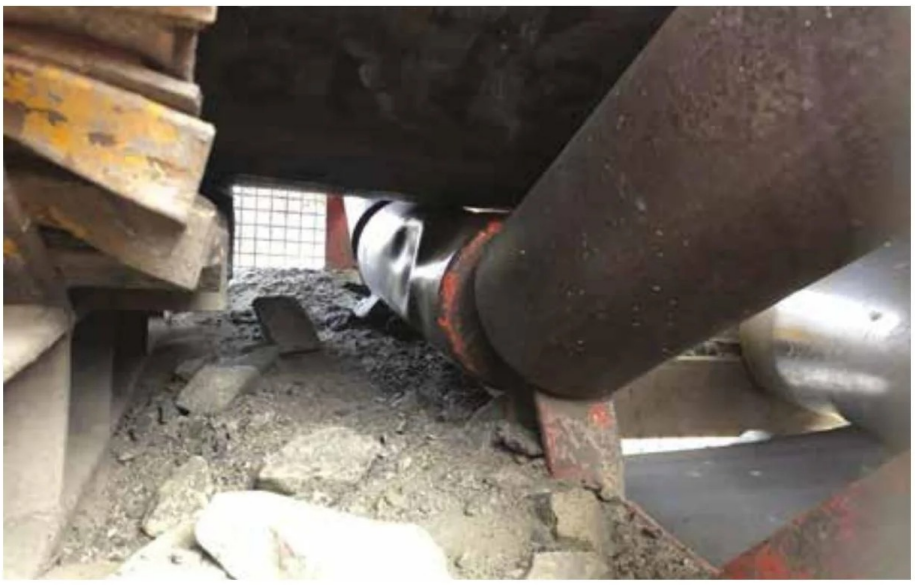
Low-grade bearings and rollers are susceptible to premature wear and when they fail, they can seize up or disintegrate, causing significant friction that can lead to motor burnout or extremely expensive belt damage. stopping the entire line in its tracks.

False economy – apparent 'savings' quickly disappear due to the cost of frequent repairs

The Solution: In all cases, only use premium quality rollers. The market for rollers and idlers is extremely competitive with huge price differences but, as with just about any product, the price is usually the best indicator of quality. Low-priced components are cheap for a reason. Precision-engineered bearings and robust rollers minimise friction and heat, extending their lifespan and requiring less energy to operate. They are designed for prolonged use, providing the fundamental reliability needed for high-throughput operations.

The two most common types are steel and nylon, with steel being the most regularly used, but the quality can vary enormously. Steel rollers rollers with high quality seals and bearings are generally the most durable and longer lasting. Nylon rollers are usually fine for lighter duty work and recycling applications where there are moisture/chemical corrosion concerns caused by the type of waste being conveyed, especially household. In these environments, nylon rollers will often outlast poorly sealed steel rollers.

Damaged rollers cause stoppages and damage conveyor belts



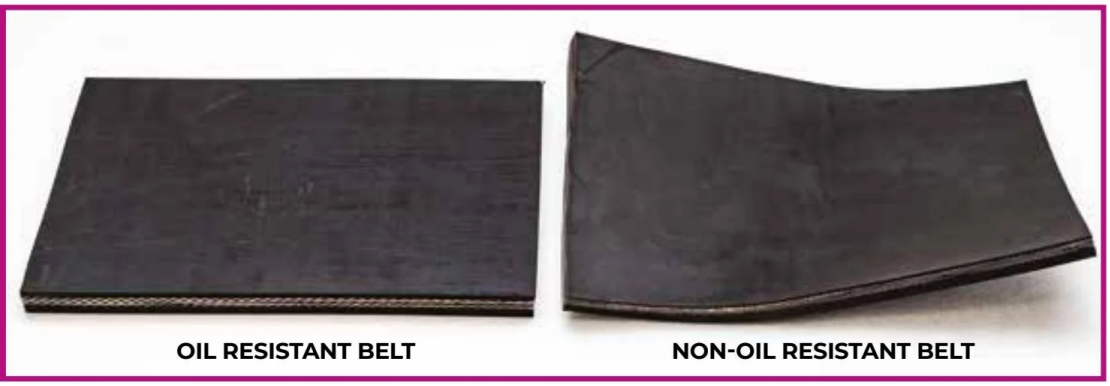
KEEP THEM CLEAN

Bearings and rollers are particularly prone to contamination from the materials they carry, which can break down lubricants and cause increased friction. Over time, this leads to accelerated belt wear and collateral damage, increased noise, and premature failure. Regular cleaning and lubrication together with maintaining as clean a working environment as possible will considerably extend their working life and the life of the conveyor belt, all of which reduces downtime.

CONVEYOR BELTS

The standards of the physical properties of the rubber used for the outer protective covers are the single biggest influence on durability and the ▶

OIL SWELLS AND DISTORTS RUBBER BELT – SAMPLES EXPOSED TO OIL FOR 2 WEEKS



Left – good quality oil resistant belt. Right – mediocre standard of oil resistance

► length of a belt's operational lifetime, which in turn is the biggest influence on the true cost of a conveyor belt. The quality of the rubber also plays a critical role in minimising the need to intervene and carry out repairs. However, rubber represents some 70% of the mass and 50% of the material cost of producing a conveyor belt so it provides an irresistible temptation for manufacturers to sacrifice even the most basic standards of resilience to create a more price-competitive edge.

OILS AND CHEMICALS

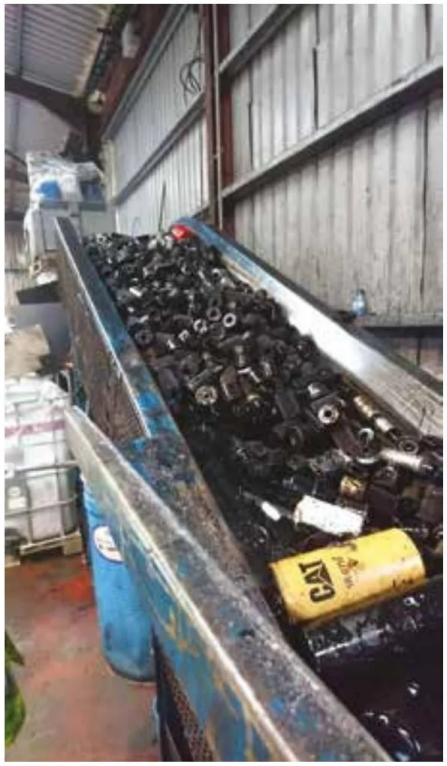
In recycling, the most predominant cause of conveyor belt problems is the damage caused by oils and chemicals. Organic waste is the largest component of household waste mixture (69%) so it contains very high levels of vegetable oils and resins that have an extremely detrimental effect on the performance and life expectancy of rubber conveyor belts. The waste can also contain a wide variety of chemical-based domestic products including bleach, corrosives and other aggressive chemicals.

When oil penetrates the rubber covers, the ability of the rubber to withstand wear decreases very quickly. As the rubber softens it also steadily loses its tensile strength and at the same time becoming much more prone to cuts, rips and tears. The next stage is swelling and distortion that cause steering and handling problems and a serious reduction in the elongation at break (the amount of stretch before the belt snaps) as well as recurring splice joint failures.

Many belt manufacturers and traders only offer one type of oil resistant rubber, which is commonly designated as 'Medium oil resistant' (MOR), which is usually fine if the waste material being conveyed is confined to vegetable oils and not, as is so often the case, mineral oils, which are more aggressive, and chemicals such as those found in household waste for example.

In most recycling and waste plants, what is needed is 'specific task' oil resistant rubber, which are readily available from manufacturers such as Fenner Dunlop in The Netherlands, who have developed two types - ROM (for vegetable oils) and ROS for mineral oils and chemicals. They also have three additional grades that combine fire and oil resistance which. In view of the fires being caused by lithium batteries, is fast becoming an absolute necessity.

Mineral oils are generally more aggressive than vegetable oils



The best quality oil resistant belts can have covers based on a combination of SBR (Styrene Butadiene Rubber) and NBR (Nitrile butadiene rubber). However, because of the high cost of nitrile butadiene, manufacturers who engineer their belts based on price attractiveness rather than resilience and longevity, not only use lower-grade nitrile but also in very limited concentrations.

For mineral oil, a full Nitrile butadiene rubber (NBR) synthetic rubber is required. The greater the concentration of nitrile within the polymer, then the greater resistance there is, not only to oil but also to corrosives. This is because nitrile provides protection against a range of aggressive chemical elements such as sodium hydroxide and potassium hydroxide, nitric acid and ammonia. The key point to all this is that although premier brand quality belts come with a higher price tag, their vastly superior resistance to abrasive wear and corrosive materials will undoubtably result in much increased levels of waste processing and a significantly lower whole life cost.

CONCLUSION

Downtime is hugely expensive in the waste and recycling industry, and the use of low-grade components is the most frequent cause. The cost of stoppages, together with the actual costs of repairs and more frequent replacements, need to be integral to the calculation of the whole-life cost of conveyor components because the lowest price frequently comes at the highest cost. •

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