EXTENDING TYRE LIFE –

A mining imperative

The spotlight is on extending tyre life as a shortage of off-the-road (OTR) tyres impacts on mining operations.

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Mining companies and other players in the tyre supply chain are taking the issue of extending tyre life extremely seriously.

The ongoing worldwide shortage of radial tyres for haul trucks and loaders in open-pit and other mining operations has focused attention sharply on ways and methods of extending tyre life.

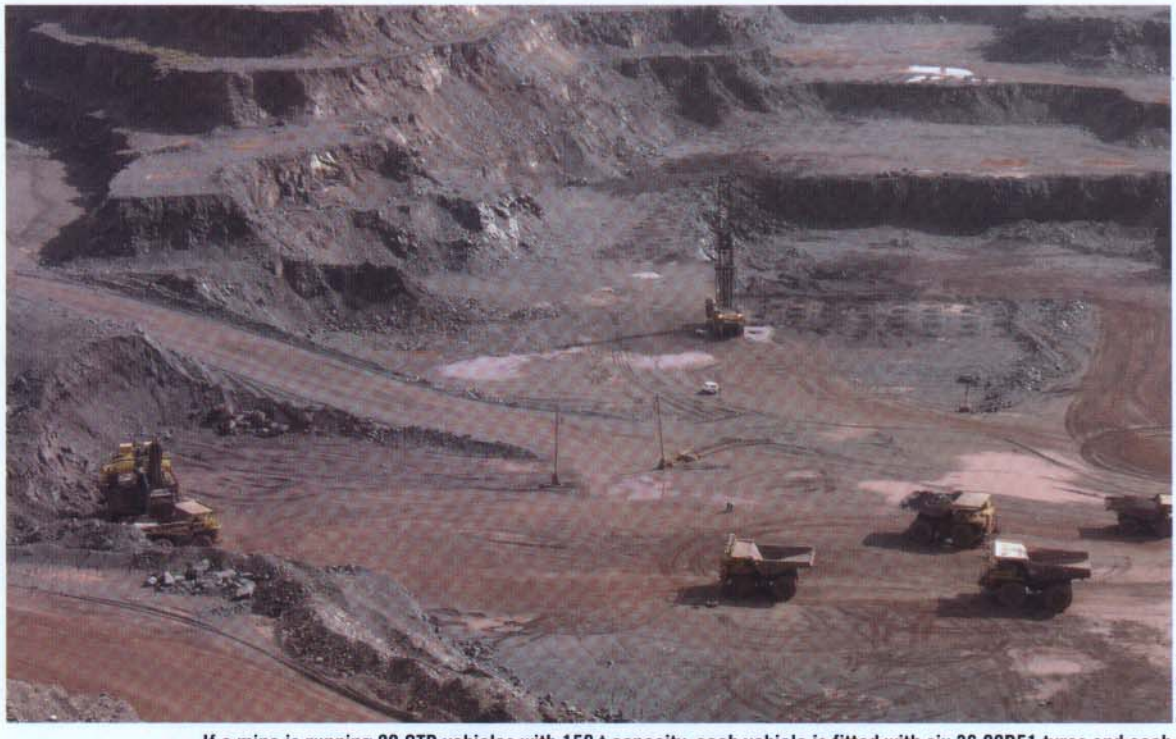
Mines, tyre manufacturers and tyre distributors are now working closely together to enhance existing methods of extending tyre life while constantly checking specifics at individual mines, since prevailing conditions can differ widely from mine to mine.

One thing that is constant is that mining houses are taking the issue of extending tyre life extremely seriously. A study carried out at 20 Anglo American mines worldwide has identified activities and actions that are now included in the company's general code of practice specifically aimed at improving tyre life.

Since the code was implemented in 2007 some mines in the group have extended tyre life by up to 93% from a relatively low base, according to the company. An initial study was carried out by a global multi-disciplinary team led by Anglo Technical Division. The team visited the sites to capture best practices around tyre use and maintenance.

Additional input was gathered from tyre suppliers, retreaders and repairers before a guideline manual of effective best practices was produced, along with a toolkit that included operator training information.

Now, Anglo American has embarked on phase two of the exercise. Nardus Venter is leading an Anglo supply chain project that will revisit every site, check implementation and upgrade both the code and training material to bring further improvements to tyre maintenance. "The key to success is the team approach. We have already achieved good results in difficult times," says Venter.



Cobus Kotzé

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SIMPLE THINGS MATTER

Venter says the biggest lever for improvement is the fact that Anglo American went back to the basics of tyre maintenance and "focused on our pit conditions – especially the loading and dumping areas and our haul roads".

"The focus on simple stuff like pressure maintenance and pre-shift inspections of tyre conditions and preventative maintenance is making a world of difference," adds Venter.

"In essence, our methodology is simple: we involve all the stakeholders in the environment, comprising the supply chain, operations or end users, maintenance or technical staff and tyre suppliers, that form an integral part of the overall team," he says.

Venter says pit conditions are regarded as a leading indicator in tyre life, along with tyre monitoring and maintenance, as well as workshop standards.

Bridgestone, a tyre manufacturer with an estimated 30% share of the OTR market segment in South Africa, reports several significant successes at various mines.

"As with most tyre manufacturers, we have a tonne kilometre per hour (TKPH) rating on our tyres, and we also have a mine rating, which depends on the speeds and loads at each particular mine," says Ernest Pattison, manager for OTR sales at Bridgestone.

"If our rating at a particular mine exceeds our tyre rating, then we know that our tyres are not suitable for that mine," says Pattison.

He adds that mines that use tyres that are on the limit of their TKPH rating usually experience a high number of "premature" tyre failures. For example, according to him, by taking the TKPH rating into account when procuring tyres, tyre life can be improved from around 7 000 h to about 9 000 h of service – sometimes as high as 11 000 h, depending on the mining conditions.

According to Pattison, if a mine is running 20 OTR vehicles with 150 t capacity, each vehicle is fitted with six 36.00R51 tyres and each vehicle is running 500 h/month for 12 months, then 720 000 operating tyre hours are required by the mine. "Divide this total by the tyre life of 7 000 h, which the mine was getting from the tyres supplied by the previous manufacturer, and the mine required 102 new tyres a year," he says.

"By improving tyre life to 9 000 h using higher rated tyres, the mine now needs only 80 new tyres a year (720 000 divided by 9 000). The saving of 22 tyres per year at an average market value of about R120 000 per tyre amounts to R2,6-million a year," he illustrates.

He says that while the savings arise only from specifying the correct tyre for the job, this cannot be achieved without involvement of the operators of the machines. Pattison says through measures such as ongoing site severity studies at mines in order to identify areas that need attention to improve the usage of tyres, it is often found that "it's a combination of relatively small things that result in good overall improvement in tyre life".

THIRD PARTY TECHNOLOGIES

Tyre users in the mining environment have had unqualified success using chains or nitrogen, and the rapid growth of specialists suppliers confirms the increasing popularity of these products.

Contract mining company, Ekapa Mining hauled material to De Beers' processing plants in the Kimberley area of the Northern Cape by trucks. According to the company's fleet manager, Pieter Potgieter, pumping nitrogen instead of air in the tyres results in significant improvement in tyre life, as this keeps the tyre pressure stable and the temperature down.

"In some cases, we have to travel for up to 10 km on a round trip at 40 km/h, running 24/7 and the tyres never have a chance to cool down," tells Potgieter. "With nitrogen, we have stable pressure and cooler rubber with no leaks as was the case with air-filled."

"Of course, selecting the correct tyres for your operating environment is absolutely crucial. At one point, we were battling to source 26.5 tyres for our earthmoving equipment and were forced to fit the wrong specification. This cut tyre life by 50%," he says.

Nitrogen tyre inflation systems are available internationally from a range of manufacturers, but in South Africa, the choice is limited to bulk liquid nitrogen in tanks or cylinders, or a free-standing nitrogen generator, which is used at Ekapa Mining. Depending on the system purchased, according to Potgieter, nitrogen definitely reduces the tyre costs.

Tom Sowry, co-owner of Nitralife,

Extending tyre life

TCS Rud

Chains

While third party technologies, such as tyre chains and nitrogen in tyres, may enhance the improvement in tyre life, selecting the correct tyres for a particular operating environment is absolutely crucial.

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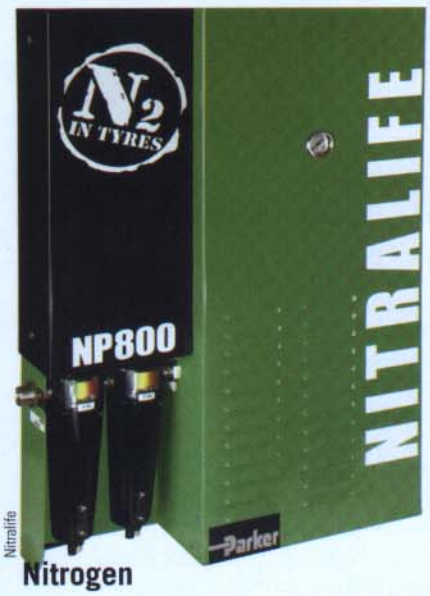
New tyres



Nitralife

Nitrogen

Nicola Theunissen

Retreading

which specialises in the supply of nitrogen generation equipment to mines, says the use of nitrogen tyre gas in the mining environment has shown steady growth since the founding of the company 12 years ago. At that point, nitrogen usage in tyres was limited to aircraft and motor racing, he imparts.

"The use of nitrogen results in tyres maintaining the correct pressure for longer. Because there is less flexing and, therefore, less build-up of heat, tyre life is extended, tyre failure and fuel consumption are reduced and running costs calculated in cents per kilometre show a marked improvement," says Sowry.

According to Sowry, the nitrogen machines filter out the oxygen, water vapour and other gases from the air.

"Tyres filled with air lose pressure because oxygen escapes through the rubber three to four times faster than nitrogen, while gaseous water vapour escapes 117 times faster. Problems arise because while escaping, these two gases age tyre rubber from the inside out, making it more porous. This is why old tyres lose air more quickly," he adds.

Sowry says nitrogen also has safety benefits because it eliminates the danger of the auto-ignition of tyres in hazardous environments. "The oxygen in air-filled tyres accelerates burning, whereas nitrogen is non-combustible. In addition, the oxidisation of rims, valves and rubber is eliminated," informs Sowry.

John Horn, CEO of tyre chain supplier, TCS Rud, says the tyre chain market in southern Africa has doubled in the last financial year to about R34-million on the back of increased demand for this product. "Mines with both above ground and underground operations are fitting chains to equipment to extend tyre life so as to achieve greater production efficiencies and tighten up costs. In addition, chains also provide added traction in certain environments," says Horn.

"The chains themselves are cost effective as their maintenance amounts to around 6% of the chain capital cost over the lifecycle of the chain. Naturally, the differing surface environments in each mine demands that chains suitable for that particular environment be specified," he adds.

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INNOVATIVE PRODUCT PACKAGING

Tyre manufacturers are forced to become innovative in the design and packaging of their products to reduce the users' reliance on third party technologies, such as tyre chains and inflation with nitrogen, in order for them to optimise tyre usage.

The Trentyre network provides a tyre flat proofing system for OTR vehicles at various underground mines in South Africa. According to Goodyear's Lize Hayward, the Arnco tyre flat proofing system replaces pneumatic/air-filled tyres with an alternative substance pumped to the required pressure and flex density as dictated by the operational requirements of individual sites.

"Trentyre follows a proactive, preventative approach to tyre protection and performance optimisation," says Hayward, adding that since every mine is different, specific studies have to be undertaken to determine tyre specification and how the technology can be used.

"Safety is paramount. The right tyre must be used for the application to extend tyre life, while correct fitting and stripping of wheels further enhances tyre protection. Tyre pressure maintenance is of the utmost importance. Tyre record keeping systems are imperative as a measurement tool to enable customers to properly measure and manage tyre performance," imparts Hayward.

Regarding operational maintenance, Trentyre works with mine operators on identifying unsuitable road surface conditions for tyres and provides training on correct tyre application as well as studies of load, dump and haul road conditions.

New manufacturers and importers

Lesego Mashigo

of tyres are beginning to make their presence known as they seek to convince mining operations that their products are worthy of consideration. Even though the jury is still out in some instances on the durability of their products, they often punt availability and aggressive pricing as key to their product offering.

Pieter Kruger, managing director of Tubestone, importers of BKT tyres from India, has tackled the issue of locally-produced bias and radial tyres head on. "If you compare prices, then you need to compare costs per hour. Downtime must be brought into the equation – how frequently does your vehicle come to a standstill as a result of tyre failure?" he queries.

However, Kruger adds that while tyres from India are more expensive than those from China, they often offer performance comparable with locally-manufactured tyres.

It seems that the drive to extend tyre life in the face of rising costs and the shortage of OTR radial tyres in particular has made mines even more wary of their operating conditions, and as 'partners' in the endeavour, the tyre trade has also come on board to optimise tyre usage at mines. ✪

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