



TRACK SHOES IN MINING

Giovanni Treleani, BS Track, presents the critical role of track shoes in the mining industry by reviewing some key features, as well as global production trends.

In the mining industry, track shoes play a crucial role in moving heavy machinery – such as bulldozers, excavators, loaders, and drilling machineries. These machines often operate in harsh conditions, including rough terrain, abrasive materials, and extreme temperatures. Track shoes are essential components of tracked vehicles, providing traction, stability, and durability to navigate through challenging environments.

Key features of track shoes

Track shoes and undercarriage are critical components of mining machinery, enabling them to operate efficiently and safely in challenging environments. Investing in high-quality track shoes and proper maintenance can help maximise equipment uptime and productivity while minimising downtime and repair costs.

Material

Track shoes are typically made of high-strength steel or other durable materials capable of withstanding heavy loads and abrasive conditions. Some may also have reinforced designs or specialised coatings to enhance wear resistance.

Design

The design of track shoes varies depending on the specific application and terrain. For example, some track shoes feature deep treads or cleats to improve traction in muddy or rocky environments, while others may have a flatter profile for smoother surfaces.

Size and configuration

Track shoes come in various sizes and configurations to fit different types and sizes of tracked machinery. Larger track shoes are often used in mining equipment to distribute weight and reduce ground pressure, which helps prevent machinery sinking into soft ground.



Figure 1. The undercarriage must be able to operate and perform a large dozer with a weight of up to 110 000 kg, where downtime is often simply not taken into account.

Maintenance

Proper maintenance of track shoes is essential to ensure optimal performance and longevity of mining equipment. This includes regular inspections for signs of wear or damage, timely replacement of worn-out track shoes, and lubrication of moving parts to prevent corrosion and friction.

Specialised applications

In addition to standard track shoes, some mining operations may require specialised types of track shoes, such as those designed for specific types of terrain (e.g. desert, permafrost, etc.) or for use in extreme conditions (e.g. high temperatures, corrosive environments, etc.).

Undercarriage performance in the mining industry is crucial

Undercarriage performance is of fundamental importance in the mining industry due to its impact on equipment stability, terrain adaptability, wear resistance, fuel efficiency, uptime, safety, and asset longevity. Mining companies must prioritise the maintenance and upkeep of undercarriage components to ensure the reliable and efficient operation of their equipment in the demanding conditions of mining environments.

Heavy load support

Mining equipment carries substantial loads, and the undercarriage bears the brunt of this weight. A robust undercarriage design ensures that the machine remains stable and can navigate through rough terrain without the risk of tipping over or becoming stuck.

Terrain adaptability

Mining operations can be found in a range of diverse environments – from rocky landscapes to muddy terrains. An undercarriage's ability to adapt to different terrains is critical for maintaining traction and manoeuvrability. This adaptability ensures that mining equipment can operate efficiently across various work sites.

Resistance to abrasion and wear

Mining environments are notoriously abrasive, with rocks, gravel, and other debris causing rapid wear on equipment. The undercarriage components – such as tracks, rollers, and sprockets – must be highly durable and resistant to abrasion to withstand the harsh conditions encountered in mining operations.

Optimised fuel efficiency

A well-maintained undercarriage contributes to optimal fuel efficiency by reducing rolling resistance and ensuring smooth operation. Minimising friction between the undercarriage components and the ground reduces the amount of power required to propel the machine, ultimately lowering fuel consumption and operating costs.

Prevention of downtime

Equipment downtime is costly in the mining industry, where every hour of lost productivity translates to significant

revenue losses. A poorly performing undercarriage increases the risk of breakdowns and unplanned maintenance, leading to costly downtime and delays in production.

Safety

A reliable undercarriage is essential for ensuring the safety of mining personnel. Equipment instability due to

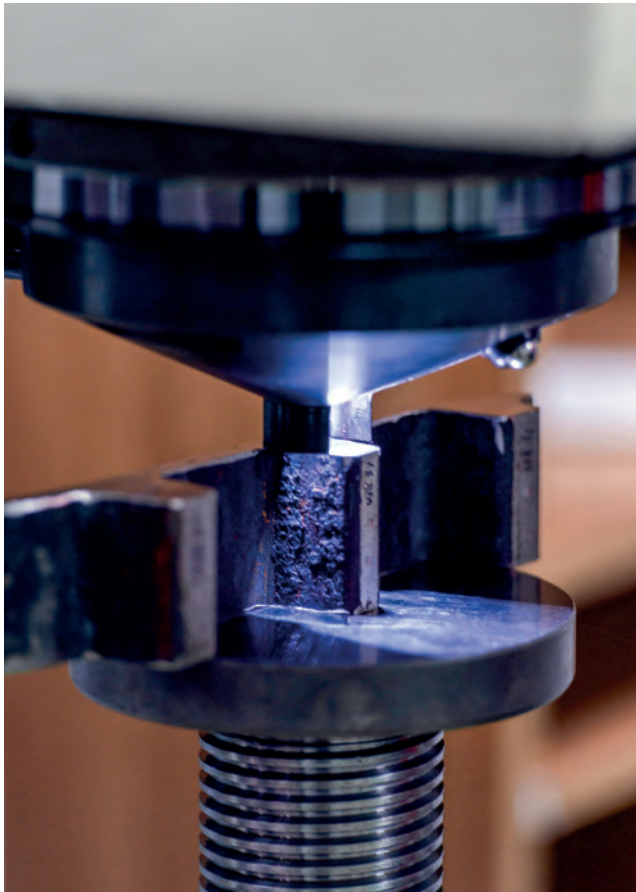


Figure 2. Leading companies provide a complete list of mechanical tests performed in their laboratories.



Figure 3. The profiles can have different shapes and thicknesses for perfect field application.

undercarriage failure can result in accidents, injuries, or even fatalities. By maintaining the integrity and performance of the undercarriage, mining companies can create safer working environments for their employees.

Asset longevity

Mining equipment represents a substantial investment for companies, and maximising the lifespan of these assets is crucial for achieving a favourable return on investment. A well-maintained undercarriage extends the lifespan of mining equipment by reducing the frequency of component replacements and major repairs.

Diving a little deeper

While other undercarriage components – such as rollers, idlers, sprockets, and track frames – are also essential, the track shoes stand out for their direct impact on traction, stability, load distribution, wear resistance, terrain adaptability, and propulsion, the key factors that determine the performance and productivity of mining equipment in challenging operating environments.

Traction and stability

Track shoes provide the primary contact between the machine and the ground, offering traction and stability essential for navigating through challenging terrain common in mining environments. Without adequate traction, the equipment may struggle to maintain stability or move efficiently, leading to decreased productivity and increased safety risks.

Load distribution

Tracks distribute the weight of the machine over a larger surface area, reducing ground pressure and minimising soil compaction. Proper load distribution is critical for preserving the integrity of the ground, especially in environmentally sensitive areas where soil disturbance must be minimised.

Wear resistance

Tracks are subjected to significant wear and tear in mining operations due to constant movement over abrasive surfaces like rocks, gravel, and debris. Therefore, they must be made from durable materials and designed to withstand the harsh conditions encountered in mining environments to minimise downtime and maintenance costs.

Terrain adaptability

Tracks come in various designs and configurations to suit different terrains and operating conditions. Whether the terrain is muddy, rocky, or uneven, tracks must adapt to provide optimal traction and manoeuvrability, allowing mining equipment to operate efficiently across diverse work sites.

Drive and propulsion

In tracked machinery, tracks transmit power from the machine's engine to the ground, propelling it forward, backward, or enabling it to turn. The effectiveness of the drive system depends on the condition and performance of

the tracks, making them integral to the overall functionality of the equipment.

Global production

Track shoes for heavy machinery, including those used in the mining industry, are manufactured by specialised companies around the world. The manufacturing process typically involves precision engineering, high-quality materials, and advanced fabrication techniques to ensure durability and performance in demanding operating environments. Here are some regions and countries where track shoes are commonly manufactured:

USA

Several companies in the US specialise in manufacturing track shoes for heavy equipment used in industries like mining, construction, and agriculture. States such as Illinois, Wisconsin, and Pennsylvania are home to manufacturers with expertise in producing high-quality track shoes.

Europe

Countries like Germany, Italy, and the UK have a strong manufacturing presence in the heavy machinery sector, including the production of track shoes. European manufacturers are known for their advanced engineering capabilities and emphasis on quality and innovation. For example, BS Track, one of the most recent manufacturers to enter this market, has established its operations in Turkey, and will serve the construction, quarrying, and mining market at a global level with its complete range of products.

China

China is a significant hub for heavy equipment manufacturing, including track shoes. Many Chinese companies produce track shoes for both domestic and international markets.

Japan

Japanese manufacturers are renowned for their precision engineering and high-quality products. Some Japanese companies specialise in producing track shoes for heavy machinery, meeting stringent quality standards for durability and performance.

South Korea

South Korea is another key player in the heavy machinery industry, with companies manufacturing track shoes for various types of construction and mining equipment. South Korean manufacturers are known for their technological advancements and competitive pricing.

India

India has a growing presence in the manufacturing of heavy equipment components, including track shoes. Indian companies often cater to both domestic and international markets, offering a wide range of track shoe options for different applications.

Other regions

Track shoes are also manufactured in other regions, including Australia, Brazil, and Russia, among others. These countries may have companies specialising in the production of track shoes to serve local industries or export markets and are, in most cases, branches from the most notable international companies from the same sector.

Conclusion

Track shoes are vital components in the mining industry, integral to the performance and reliability of heavy machinery – such as bulldozers, excavators, and loaders. Made from high-strength materials and designed to withstand harsh conditions, track shoes provide essential traction, stability, and durability, enabling equipment to operate efficiently across varied and challenging terrains. Proper maintenance and specialised designs further enhance their performance, ensuring safety, fuel efficiency, and minimal downtime.

The global manufacturing landscape for track shoes includes notable hubs in the US, Europe, China, Japan, South Korea, and India, each contributing to the innovation and quality of these critical components.

Ultimately, investing in high-quality track shoes and maintaining the undercarriage systems are crucial for maximising the productivity, longevity, and safety of mining operations. **GMR**

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