8 Crucial Elements of a Tire Safety Program

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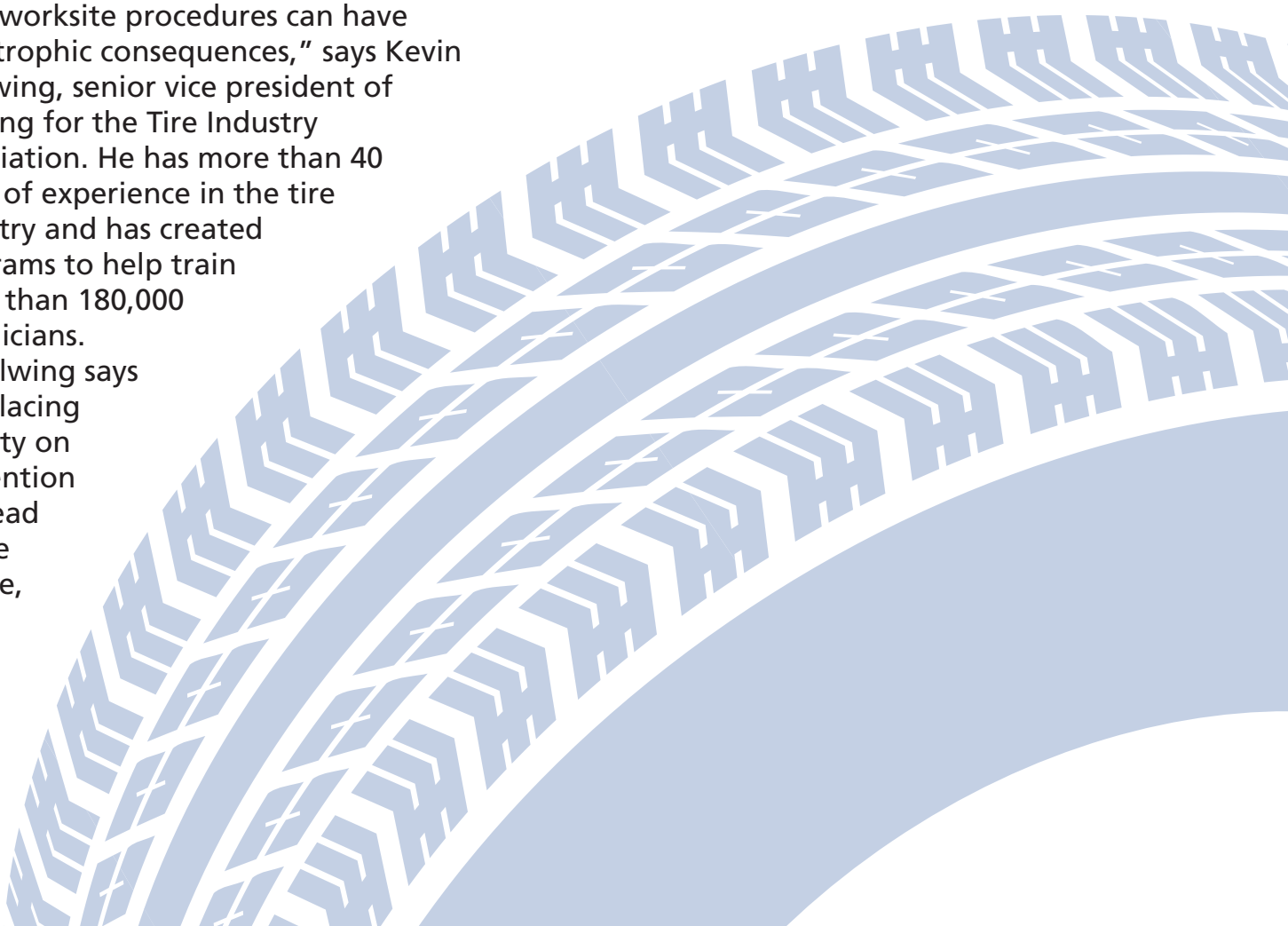
Tires are the workhorses of the jobsite and, along with labor and fuel, are considered one of the top three operating costs of heavy equipment. That's why establishing a rigorous tire safety and maintenance program, no matter the size of the company, can pay off with increased uptime, productivity, safety, and on-time completion, says David Smith, marketing manager, construction, quarry and infrastructure for Michelin North America. "When it comes to transporting and operating heavy machinery, you never want to skimp on safety. You always want to be proactive, set your safety and maintenance programs up and adhere to them," Smith says.

The benefits of a strong tire safety and maintenance program are in sharp contrast to the consequences of skipping safety protocols or deferring maintenance. "Eyeballing pressure, winging it or other poor worksite procedures can have catastrophic consequences," says Kevin Rohlwing, senior vice president of training for the Tire Industry Association. He has more than 40 years of experience in the tire industry and has created programs to help train more than 180,000 technicians.

Rohlwing says not placing priority on prevention can lead to tire failure, increased costs, equipment damage and worksite injuries. Some preventive steps, such as cleaning up sharp objects that could puncture a tire, are simple and common sense. Maintaining haul roads and loading areas in mining and quarry operations keeps large objects away from the path of tires. Preventable failures such as improper inflation result in costly downtime while waiting for repairs or replacements. "Unplanned and preventable failures can be very costly when expensive tires are removed from service prematurely because someone didn't do their job," Rohlwing says.

Best practices in tire safety and preventive maintenance programs go hand-in-hand. When you operate the correct tires for the application and they are properly maintained, regularly inspected and safely inflated and stored, your equipment will handle better with increased fuel efficiency.



8 BEST PRACTICES FOR TIRE SAFETY

Here are eight crucial tire practices to increase uptime, keep operators safe and reduce costly, preventable failures.

1 CHOOSE THE RIGHT TIRES

Choosing the right tire optimizes tire and fuel budgets and helps ensure work is done safely. The decision should be based on expected performance and actual conditions of use. Running less expensive tires can negatively impact safety. Those tires won't last as long and can decrease work efficiency.

The best place to begin the process is with your manufacturers and dealer. They will assist you in matching the right size tire to the operation based on equipment type/size, tire design, ton-mile-per-hour (TPMH) rating, jobsite terrain and grade, surface conditions, type and weight of materials hauled, distance traveling and other factors.

Multiple conditions of use

The tire is the only point of contact between the machine and the ground. The huge range of factors to which it is subjected has a major effect on its functions:

- **nature of the ground**
- **condition of the site roads**
- **external temperature**
- **pressure**
- **load**
- **speed**

Four types of use

The sidewall of a tire indicates which type it belongs to:

C: Compactor
E: Earthmoving
G: Grader
L: Loader and bulldozer

2 CHOOSE THE CORRECT TREAD

When choosing the tread pattern of a tire, consider the intended conditions of use. Within these categories, there are different tread depths and special tread patterns for very specific uses. These are identified by a number. They must be chosen according to the expected type of ground and the tire's probable conditions of use. The choice of tread type depends primarily on the soil or road surface most used: traction, abrasion and cut risk and rapid wear and tear. Optimum material performance largely depends on the choice of tire.

1: **Lined/ribbed (normal tread depth)**
2: **Traction (normal tread depth)**
3: **Normal (normal tread depth)**
4: **Depth (deep tread)**
5: **Very deep (deep tread)**
6: **Flotation (normal tread)**

Know your TMPH

To choose the right tire, you need to know your TMPH. The TMPH (ton miles per hour) is an essential characteristic of the working capacity of your tires. For the same size and pattern, there may be several types of rubber, each associated with a different TMPH. TMPH and TKPH (Ton Kilometers Per Hour) values are part of the tire characteristics. The values depend on the load capacity of each size, the number of miles allowed per hour per tire type and are given for a standard ambient temperature of 38 ° C.

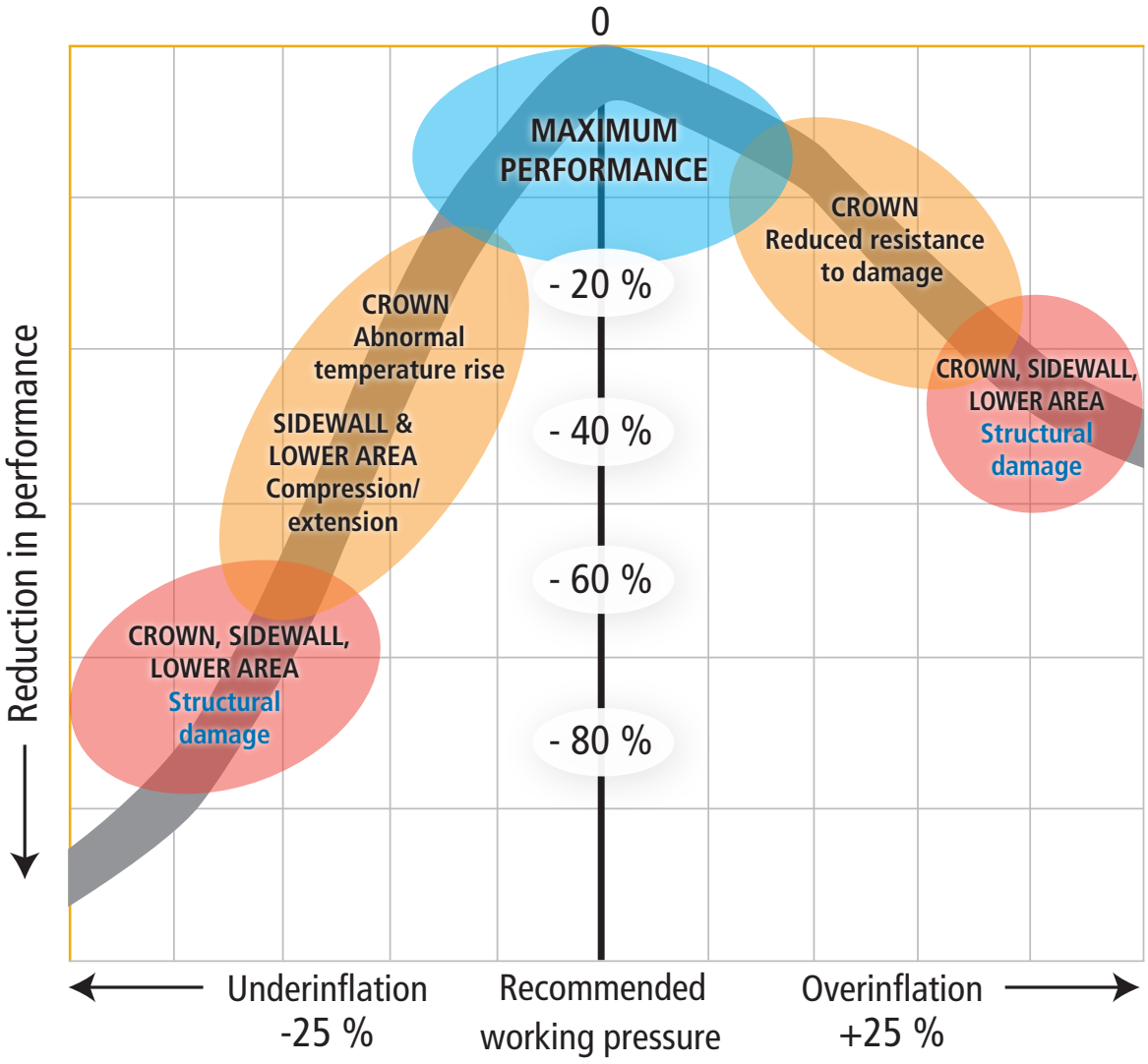
3 CHOOSE CORRECT WHEELS AND COMPONENTS

When it comes to wheels, it all starts with the equipment manufacturers who are involved in the entire process from cradle to grave. It's important to consult the manufacturing rep and tire dealer rep throughout the process. The tire manufacturers create tires that marry the equipment manufacturer wheel specs to the tire.

4 INFLATE TIRES PROPERLY

Correct tire inflation is essential for optimizing tire performance, smooth vehicle handling, tire integrity, and most importantly, operator safety.

Under- or overinflation can result in serious safety issues and tread or tire loss. It's never OK to eyeball the tire when inflating, and you must consult the owner's manual to know correct pressure. David Smith says they urge end users to allow dealers and manufacturer representatives to prominently place signage where tires are aired up, especially on loaders



where incorrect front and rear balances can cause tipping. The operating pressure can be given by your tire manufacturer rep, or by an authorized professional who will consider tire usage criteria (type of machinery, type of soil, length of cycles, materials transported, loads, etc.).

Smith says a dump truck with an underinflated tire going down the haul road may not appear to be overheated, but it's close to failure and the consequences can be catastrophic. "We are talking about huge tires where the dangers are amplified by explosions, rapid deflations, pyrolysis, and even simpler events like a zipper rupture. When these things happen, you are talking about a 25,000 ton piece of equipment tumbling, loss of control and possible loss of life," he says.

According to Michelin, both underinflation and over-inflation are critical issues. Insufficient tire pressure leads to an abnormal rise in the operating temperature which may cause irreversible damage to internal components, and cause tire destruction by rapid pressure loss. Overinflation can cause rapid and uneven wear and increased sensitivity to road hazards (tread damage, carcass breakage).

Check pressure when tires are cold. If the check is performed after driving, the tire is considered hot. In this case, the pressure must be readjusted according to the manufacturer's recommendations, and you should consult your tire rep. As pressure increases with temperature, never deflate a hot tire. Always maintain equal pressure between dual tires.

Dangers of underinflation

Underinflation causes increased flexing of the tire's sidewalls, resulting in a rise in its internal temperature and uneven wear.

- **Zipper tire: When you are running a tire that is underinflated, the shoulder and sidewall become hot and rupture.**
- **When to scrap: Anytime your tires are more than 20-30% underinflated you need to red tag and remove from service.**

Problems with overinflation

Overinflation creates premature wear of the tread, reduced resistance to impacts, cuts and uneven wear.

- **Loss of traction and flotation**
- **Tire stress and damage (and decreased tread life as well).**
- **By overinflating a tire you can see decrease in performance and tread life by 20%.**
- **Leads to additional tire wear.**

5 AVOID PYROLYSIS

When a rubber tire becomes overheated, a chemical reaction in the rubber called pyrolysis can occur. Pyrolysis causes the rubber to deteriorate. At a certain point, this deterioration can create a very rapid pressure increase inside the tire and can cause a sudden and unexpected explosion. Pyrolysis can occur when heat is applied to a tire, such as when heating lug nuts using a blow torch.

Other heat sources to avoid:

- Overheated brakes
- Aerosol tire inflators
- Welding on or near the tire
- Contact with electricity (e.g., from overhead powerlines or lightning).

Once this chemical reaction starts, it can continue after the heat source is removed. Pyrolysis can last seconds or hours. There are no visible signs when it's taking place until the explosion occurs. (Source: IHSA.CA)

Best practices to reduce fire risk and explosions

- **Use the right tires for the application. Consult the manufacturer on load and speed limits.**
- **When mounting tires, do not spray products from aerosol cans into the tires and check that no foreign bodies have been inadvertently left in them (for example, wooden packing pieces).**
- **If the tire is inflated with air, check that no flammable vapor (alcohol, liquids stored nearby) is taken in by the compressor (risk of transfer to the tire).**
- **Inflate the tires and adjust the pressure, using nitrogen rather than air.**
- **Keep the inflation pressure at the level recommended by the manufacturer.**
- **Fit machines with a remote tire pressure monitoring system (TPMS)**
- **Equip machines with an automatic fire suppression system.**
- **Never weld on or heat the wheel while the tire mounted on it.**
- **Mark out the site haul roads, avoiding steep slopes and tight corners to limit heating of the machine's brakes.**
- **Drive at speeds appropriate for the road.**

6 SET UP A TIRE MAINTENANCE PROGRAM

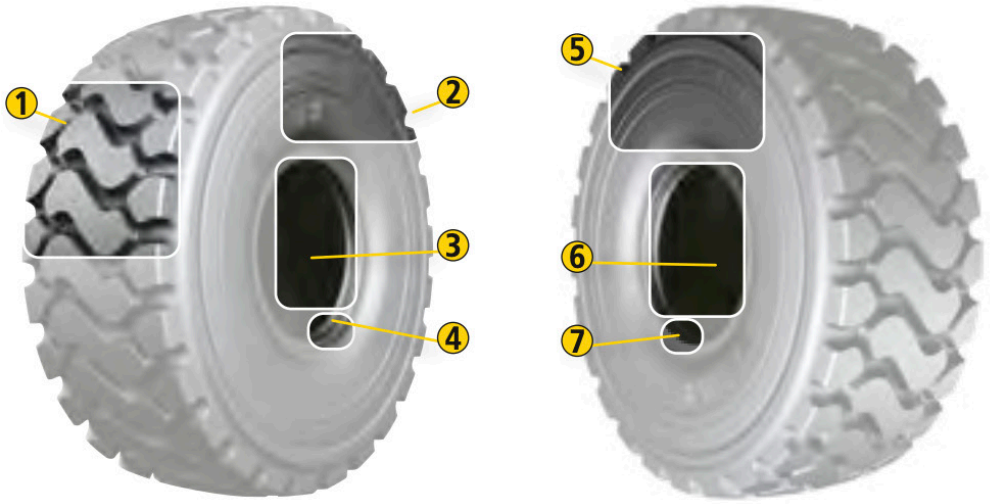
Your tire safety plan should include a maintenance program for operators. While tire failures cannot always be prevented, properly trained operators can flag issues before they occur.

Train operators to perform routine tire maintenance by coaching them to avoid tire destructing behaviors such as hard turning and stopping, exceeding haul speed, running over debris and running in severe weather or on wet worksites.

Rohlwing says once trained operators understand their role in protecting the tires, they gain ownership of their equipment. Whether it's cleaning up the loading area or maintaining the proper speed on haul roads, how the operator uses the machine will have an impact on tire costs. More importantly, it's up to the operators working with the crews that maintain the haul roads and the maintenance department to report any issues or problems. In a mine or quarry operation, tire costs are controlled by a lot of people, but the operator still has the greatest impact.

PROCEDURE

1. Tread and shoulder of the tire, to ascertain its conditions of use.
2. Exterior of the first sidewall.
3. Interior of the opposite sidewall. (up to the center of the tread)
4. Bead of the first sidewall.
5. Exterior of the second sidewall.
6. Interior of the first sidewall. (up to the center of the tread)
7. Bead of the opposite sidewall.



Checklist:

- Check tire pressure: All operators should have an accurate pressure gauge and check their tires daily. Check the equipment owner's manual or the load and tire information placard for the equipment's precise pressure measurement.
- Inspect tread: Look for cuts, embedded objects, excessive wear, uneven wear and detaching.
- Examine sidewalls for cracks, bulges, cuts and bubbles.
- Check bead for cracks, deformation, seating and bluing.
- Check wheel: Note any damage, wear, cracks, broken studs or loose lug nuts.
- Examine rims that are bent or cracked.
- Clear the wheel components of mud or debris and check for damage.
- Keep tires clean by only washing with warm soap and water.
- Record any defects and make sure to tell the operations manager or servicing dealer.
- Correct the issues.

7 STORE AND HANDLE TIRES CORRECTLY

Proper storage extends tires life. "Once acquired, a tire becomes a very important asset. Where and how you store them is crucial to maximizing their performance levels and ensure the integrity of the tires," Smith says.

The rubber used for tires is subject to natural aging. To prevent storage shortening the lifetime of tires, they must be stored under specific conditions and for a limited length of time. Indoor storage is preferable but both indoor and outdoor storage have different requirements.

- Location: Store in clean, dry and a well-ventilated room, avoiding heat, direct sunlight and ozone exposure.
- Keep away from chemical substances, solvents or hydrocarbons.
- Make sure there are no objects such as wood or metal tips that can pierce the rubber.
- Positioning: Never store a tire on its side. This prevents water from pooling inside. The Environmental Protection Agency sees standing water as a violation.
- Clean and repair: Use tire-specific soaps and keep your tires free of debris.

8 INCORRECT HANDLING OF THE TIRE CAN CAUSE IRREPARABLE DAMAGE

Precisely defined methods must be used when handling tires. Failure to use these methods may cause irreparable damage to tires and may even be dangerous. The bead is a sensitive part of the tire, and if it is damaged during handling operations, this may lead to premature scrapping of the tire. To limit the risks:

- Do handle tires using the appropriate equipment for this type of work: forklift truck, mechanical loader or crane equipped with a tire handler or textile straps.
- Do lift the tire by the tread.
- Don't lift a tire directly with the hook of a crane.
- Do use flat straps (not metal slings or chains).
- Do pick up the tire from under the tread and not at the beads when using a telescopic forklift truck.

CONCLUSION

By not prioritizing tire maintenance and safety procedures, you may be reducing tire life and increasing the chances of tire-related failures. Tire failure cuts down on productivity, creates costly downtime and even runs a risk to operator safety. These factors all cut into company profits and just don't make good business sense. "If you are not paying attention to such a large operational asset, you risk major impact on operators' safety and unnecessary operational costs," David Smith says.

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