By Kara Kuryllowicz

RUBBER RELIANCE

Safety, comfort, cost efficiency and more ride on a vehicle's tires

On the road and even at rest, drivers are well aware of their vehicle's performance, handling, fuel efficiency, operating costs and safety features but rarely contemplate the tires' often-profound impact on any of those. Fortunately, the manufacturers consider tires standard equipment and select the brands and models that will keep occupants safe while delivering a comfortable, enjoyable and cost-effective ride.

Yet as much as the tire itself matters, the air in those tires is also of paramount importance, because the weight of the vehicle, its engine and everything in it—including the occupants and their luggage—rides on that air and those sidewalls.

Despite the fact both under- and over-inflation will negatively affect safety, performance, fuel consumption and wear, drivers rarely check their tires' air pressure because it's an awkward, often dirty task that takes a few extra minutes. Notably, under-inflation is far more common as the typical passenger vehicle loses 1 psi per month and another 1 psi for every 10F drop in temperature. T.J. Tennent, engineering manager, Bridgestone Firestone, consumer products, motorcycle and karting, government, products, Nashville, TN, and John Meiklejohn, account executive, Element Fleet Management, Mississauga, Ont., note that an under-inflated tire produces far more friction than normal and the resulting heat build-up could cause a catastrophic tire failure. Meanwhile, an over-inflated tire can extend the braking distance on wet surfaces and is more susceptible to breakage on impact, for example, if a pothole is hit.

As a result, tire pressure monitoring systems (TPMS) and run-flat tires continue to be of interest. In Canada, TPMS is not a requirement although it has been mandatory on all new light vehicles sold in the U.S. since September 2007. Transport Canada recommends inspecting and servicing tires regularly and always inflating tires to the correct pressure for safety's sake. In fact, Transport Canada also suggests checking tire pressure and wear on a monthly basis, even on TPMS-equipped vehicles.

"Manual tire pressure checks are vital, because TPMS may not kick in until the pressure is 15- to 20- percent below the vehicle manufacturer's minimum recommended specification, and rubber manufacturers note that if your tires are under-inflated by 20 percent, you may have done irreparable damage to the tire," says Tennent, who notes accurate tire pressure readings are possible only if tires are at the ambient temperature, and suggests adding if pressure is at or just under the specifications.

Tennent notes that driving even five to 10 minutes will heat the tires and subsequently the air in them, which temporarily expands and results in a higher air pressure than if the air pressures were checked at ambient temperatures. How much higher the air pressure readings will be depends on everything from the size of the tire and the moisture content of the air in the tires to whether or not the air mix contains nitrogen and how hot or cold it is outside. That makes it impossible to predict whether the air pressure reading is 2, 5 or 10 PSI over what is actually in the tire.

"I'd rather you check your tire pressures occasionally or regularly and get a somewhat inaccurate reading than never pay any attention to it at all," says Tennent, who says you virtually never have to let air out of tires and typically need to inflate them.

Drivers who are more than just a few minutes drive to a service station should consider buying an air pressure gauge at retail for use at home to ensure accurate readings. A digital air pressure gauge, readily available at retailers such as Amazon and Wal-Mart ($13 and up), are typically less prone to inaccuracy than dial ($8) or pop-up ($4 and up), particularly over time and if dropped.

TPMS may be direct, pulling the pressure and temperature data from on-wheel or on-tire sensors that identify each tire by location, or indirect, working off the ABS and other systems, such as vehicle stability assist. Direct TPMS tends to provide detailed data on each wheel, while indirect will communicate only that there is under- or over-inflation.

"General Motors offered TPMS well before it was mandated in the U.S. in 2007, because correct tire inflation has an impact on so many performance parameters, for example steering, handling and fuel economy, and consumers really don't pay a lot of attention to tires or tire pressure," says David Cowger, global tire lead engineer, General Motors, Milford, Michigan.

Mercedes-Benz offers a Tire Pressure Loss Warning System, which uses the ESP and ABS sensors to determine if there is a loss of pressure, on all vehicles. As a result, it doesn't require additional sensors on the wheel, which facilitates seasonal tire switches, but also means the driver can't get specific pressure readings on individual tires. In addition, Mercedes-Benz offers a full sensor-based Tire Pressure Monitoring System, standard on all AMG vehicles, as an option on many models.

While TPMS is as much about cost, convenience and performance as safety, today's run-flat tires focus on safety and security rather than the trunk space they free up. Run-flat tires allow travel with a punctured, virtually airless tire at reduced speeds, typically 80km at 80kph or lower until the tire is repaired or replaced, although not all repair shops carry run-flats.

Years ago, consumers complained about the trunk space consumed by full-size (even the subsequent, smaller, temporary) spare tires to the point some carmakers replaced the spares with pumps and repair kits, but security and convenience also played a key role in the advent of run-flats, says Cowger.

The Porsche 959 was the first mass-produced vehicle equipped with run-flat tires, making them standard equipment in 1987, while they became a Corvette option in 1993. Run-flats were standard Corvette equipment from 1997 on and are now standard in the Cadillac ATS and CTS, which were designed without a spare tire tub in the trunk. "We typically only see run-flats on executive vehicles such as BMWs, and Mercedes however they have started to trickle down to less expensive models such as the Nissan Rogue," says Meiklejohn.

The run-flats have developed a more comfortable ride and improved durability and affordability, with run-flats such as Bridgestone Firestone's DriveGuard tire line similar in ride and cost to mass-market, all-season tires. DriveGuard is the first full line of mass-market replacement tires for coupes, sedans and wagons not originally equipped with run-flats and comes with an 80,000-to-100,000km mileage treadwear warranty.

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"Puncture a DriveGuard, even at highway speeds, and you won't know that you're low on air or driving on a flat—you'll have to rely on your TPMS to tell you," says Tennent, noting Bridgestone Firestone offers its Blizzak winter tires in a run-flat version.

While run-flats have improved, there may still be some tradeoff, says Meiklejohn, noting the stiffer ride, higher replacement cost, the fact they may wear 10,000kms before a regular tire and may not be available if a driver needs a replacement in a remote area.

BMW offers run-flats on most models but its performance vehicles feature sports performance tires because consumers want and expect a certain kind of handling and driving dynamic.

"Run-flats offer peace of mind because no one wants to be stranded or replace a flat roadside and a blow-out while driving has an impact on the vehicle's stability as well as the driver's ability to control the vehicle," says Barb Pitblado, director, corporate communications, BMW Group, Mississauga, Ont. **C.A.R.**