



# Advanced tyre technology

The technologies optimising tyres today  
and the innovations shaping the future





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## A history of innovation

The history of the tyre is a history of constant innovation.

From the introduction of synthetic rubbers to tubeless and radial tyres to sensors that enable remote health monitoring, the tyre has never stopped evolving over the last 140 years to meet the world's shifting mobility needs.

Today, global megatrends like digitalisation, urbanisation, an ageing population and the impact of climate change are altering the way we live, work and travel. As the world continues to embrace mobility that is connected, autonomous, shared and electric, the tyre is changing to help both people and businesses deal with the challenges and take advantage of the opportunities of the age.

Understanding these changes is of vital importance to anybody running a business fleet.

Often, when an innovative new tyre technology arrives to improve performance, business fleets are amongst the earliest adopters. When you consider how much tyres influence the safety, efficiency, cost effectiveness and sustainability of a vehicle, it's easy to understand why.



**Fuel efficient tyres can save up to 5% of the average truck fleet's total cost of ownership.<sup>1</sup>**



**81% of fleet operators rate tyre management as either 'crucial' or 'very important' to their business.<sup>2</sup>**



**18.4 million tonnes of carbon dioxide are needlessly created each year due to under-inflated tyres.<sup>3</sup>**



**Tyres are the second most regularly cited reason for breakdown call-outs in the UK, making up 13% of all breakdowns.<sup>4</sup>**

Clearly, if you manage a fleet, tyres have a significant influence on your bottom line and your corporate objectives. So, what are the technologies that you can leverage to get a higher level of performance from your tyres? How can they help you deal with the unique challenges of this disruptive time in mobility and business? And what coming innovations can help you maximise this performance long into the future?

This eBook looks at a selection of the most compelling advanced tyre technologies of today and tomorrow – the solutions, the processes and the models that are re-shaping the tyre and what they mean for you.





# Reinventing the wheel

Tyre models to suit the changing  
mobility world





Let's begin by looking at the hardware itself: **the tyre.**

This section looks at some of the ways the tyre is evolving to support modern fleets looking to stay sustainable, safe and efficient.

# The silent tyre

Tyres make a significant contribution to the noise produced by a vehicle. When the vehicle is electric, this becomes more prominent, as the engine is running almost silently. So, how can we make sure the EV revolution is a quiet one?

The noise from a traditional tyre comes from several key places. One is the air compressing against the wheel in the cavity of the tyre, which becomes harsher as you pick up speed, resonating through the vehicle. Another is the air bubbles that are created as the tread rolls over the road. The higher the speed, the more bubbles and the more noise.

In the Bridgestone Noise Lab, the team closely analyse the noise levels of each new tyre and pinpoint adjustments which can dramatically reduce in-vehicle and exterior noise. Bridgestone B-Silent technology has been developed to minimise road noise. It's designed with a layer of sound absorbing foam fitted inside the tyre, which sends fewer vibrations through the car.

## What does it mean for fleets?



The driver enjoys a more peaceful, quieter journey and can communicate more easily with people in the car or over a communication device.



Electric vehicles become a more enjoyable drive, as the lead source of noise is muted.



Less noise pollution means a nicer living environment for everybody, particularly in urban areas.





## The air free tyre

Airless solid rubber tyres have been used for decades on heavy construction equipment like forklift trucks or appliances like lawnmowers. Now, however, new, air free tyre models are being developed that could be light enough to keep a car, LCV or truck riding comfortably on a public road and at a high speed.

While the traditional pneumatic tyre uses an air chamber to support the weight of the vehicle, these air-free tyres use another method - a unique structure of flexible spokes housed within the tread. With the spokes holding up the vehicle, air is no longer necessary and all the problems that come with it are off the agenda.

With a number of different manufacturers working on air-free designs, it seems certain air-free tyres will one day come into widespread usage.

There are some issues that need to be overcome first, however. One key challenge is the potential impact of debris getting trapped between the spokes, reducing their flexibility and disrupting the vehicle's balance.

### What does it mean for fleets?



Air is no longer a factor, which means flat tyres are no longer a problem. This translates to more uptime and less distractions from your core business.



Air-free tyres have a lower rolling resistance and are less prone to malformation, meaning less fuel consumption and less emissions.



The air-free tyre comes with a more uniform tread surface. This improves traction at low speeds, making for smoother cornering.



# The tyre retread

Needing to replace your tyres does not, necessarily, mean throwing out your old ones and installing a brand new set. Though tyre retreads from companies like Bandag have been around for decades, they provide an option that is ideal for the modern truck fleet that ranks being sustainable and being productive as equally important goals.

Bandag uses a patented, highly standardised Retreading Process, geared towards restoring the original performance level of a tyre while maintaining consistency and reliability.

This process ensures that premium retreads are a safe, reliable alternative to new tyre purchase that support the transition to a circular economy. The core impact for a commercial fleet is two-fold: cost effectiveness and sustainability.



**bandag**

## What does it mean for truck fleets?

**30%**

Retreads deliver similar performance levels to a new tyre but at a fraction of the cost. Generally, tyre retreads come with up to 30% lower costs per kilometre compared to new tyres.<sup>5</sup>

**70%**

Bandag retreads require 70% less oil and 14 kg less steel per tyre to produce when compared to the manufacturer of a new tyre.

**80%**

The manufacturing process of Bandag retreads produces up to 80% less carbon emissions according to Bridgestone process data.

# The lightweight tyre

Tyre rolling resistance is one of the key factors that determines a vehicle's fuel consumption and CO2 emissions. Essentially, it is the amount of energy tyres need to expend to move the vehicle at a consistent speed over the road. The more energy the vehicle needs to send to the tyres, the more fuel is consumed and the heavier the impact on the environment.

Bridgestone's Enliten technology is a new innovative lightweight tyre technology that represents an unmatched reduction in material and rolling resistance performance to contribute to the reduction of a car's CO2 emissions, while providing the same wear life as a standard original equipment tyre. This has been achieved via a proprietary compound mix with a decreased tread depth, a reduced inner liner thickness and a new mould design.

## What does it mean for car fleets?



Enliten technology can reduce rolling resistance by up to 30% translating to lower fuel consumption and less CO2 emissions. Weight is reduced 20% from equivalent Bridgestone premium conventional summer tyres. <sup>6</sup>



Tyres require 2kg fewer raw materials to produce, so it's sustainable right from the start of its lifetime.



Vehicle handling and stability are improved, while fuel consumption, battery use and CO2 emissions are all reduced.





A futuristic digital dashboard with various data points and lines. The background is dark with glowing red and white lines and data points. A speedometer is visible with the text 'SPEED KM/H' and numbers '58' and '60'. A circular gauge shows '2.03%'. A GPS display shows 'GPS' and '51.32.59'.

# Digitising the tyre

The digital solutions driving tyre performance to the next level



The last decade has seen more and more of the day-to-day work of a business fleet digitised. But automating and digitising existing processes is just one element in the overall picture.

Digitalisation, where the addition of digital solutions allows new, previously impossible processes to be introduced and new levels of performance reached, is even more exciting.

Here's a selection of some of the many digital solutions that are helping business fleets get more from their tyres.



# Optimising the tyre with data

For years, business fleets have been using telematics solutions to understand and leverage their vehicle data. The constant aggregation of valuable, real-time data from your vehicles, assets and drivers allows you to make smart adjustments and powerful improvements to your operation. Now, increasingly, data-driven telematics solutions are also being used to optimise tyre performance.

For example, with huge amounts of data related to loads, routes and stops provided by a fleet management solution like WEBFLEET, you can identify the most suitable tyres for the operation of each vehicle.

Another example is WEBFLEET OptiDrive 360. Accurate insights into how your drivers are using your vehicles on the road are displayed in WEBFLEET's reports. With data on speeding, fuel consumption, harsh braking and similar factors, you can zero in on behaviour that damages your tyres and encourage improvements to counter it.

## What does it mean for fleets?



Having the right tyre on your vehicle means a longer tyre lifetime and lower running costs



Better driving translates to less wear and tear and tyre damage for a safer all around fleet.



The combination of a longer tyre lifetime and greener, safer driving offers a powerful boost to your fleet's sustainability.



# Tyre damage monitoring systems

Last year, Bridgestone and Microsoft launched the unique Tyre Damage Monitoring System. The Microsoft Connected Vehicle Platform (MCVP) cloud framework together with Bridgestone's proprietary algorithm detects events that could harm either the surface or the carcass of the tyre. The driver receives a notification and can then take the appropriate action.

As the solution exclusively uses data that is captured by the vehicle sensors already installed on the tyres, no extra hardware is required for vehicles to use the system. As well as reducing the risk of tyre damage, it also makes for much more efficient tyre inspections.

This solution has been prototyped in the Amazon Web Services (AWS) connected vehicle platform and was featured in the AWS Innovation Ambassadors podcast.

## What does it mean for fleets?



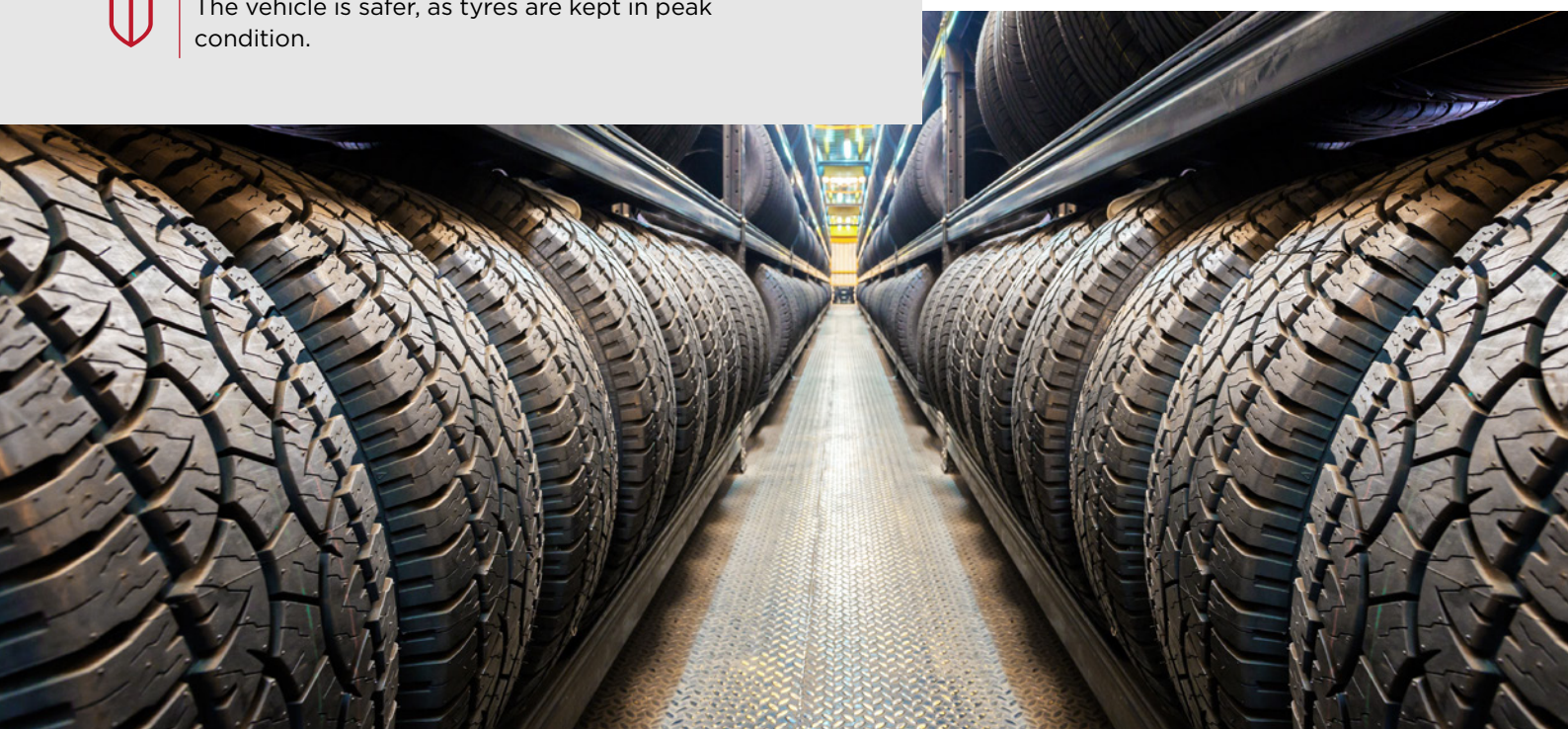
Fleet managers and drivers are alerted quickly when a tyre is damaged, meaning they can solve the issue early, before it disrupts their business.



The time spent on manual checks can be reduced and more intelligent, focused action can be taken to remedy the situation.



The vehicle is safer, as tyres are kept in peak condition.





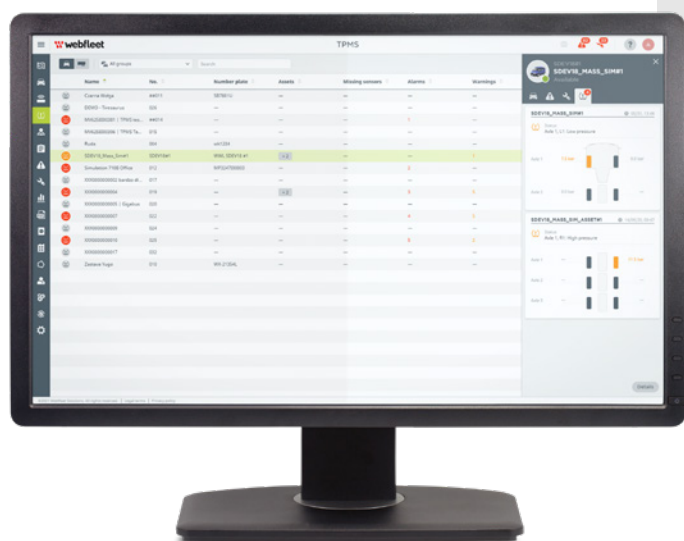
# Tyre pressure monitoring systems

A 20% drop in tyre inflation pressure translates to a 2.5% increase in fuel consumption. Yet 20% of commercial tyres on the road are significantly underinflated. While that makes tyre pressure a high priority for anybody managing a fleet, manual pressure checks are time consuming and prone to human error.

In fact, 90% of tyre-related breakdowns are caused by slow leaks, which are difficult for drivers to detect with a visual check.<sup>7</sup>

A tyre pressure monitoring system (TPMS) digitises and automates this entire process. It utilises sensors that identify tyre pressure and temperature issues from one or all of a vehicle's tyres.

With WEBFLEET TPMS, this information is then sent to the WEBFLEET Telematics Service Platform, which alerts the fleet manager in the office and the driver in the cab in real time. This allows them to take action before the issue evolves into a problem that could lead to disruptions and costly downtime.



## What does it mean for fleets?



TPMS reduces vehicle downtime by detecting tyre issues before they become major problems. It can also spot issues that are difficult to detect manually, such as slow pressure leaks.



Tyres kept at the correct pressure help to keep vehicle handling and braking distance at optimum levels for a safer fleet.



Properly inflating your tyres translates to lower fuel consumption. It also means they won't wear at a faster pace than normal. That's good news for both your budget and sustainability goals.



Correct tyre pressure improves the retreadability of tyres. That helps maximise tyre mileage and service life for a more sustainable operation.

# The virtually developed tyre

The traditional way to design and develop a tyre is heavily reliant on physical, real world testing. In fact, up to 40,000km worth of track testing is required before a tyre is ready for the market.<sup>8</sup> By digitising tyre development, however, a more sustainable and more time effective process is made possible.

With Bridgestone's Virtual Tyre Development, a digital twin of the tyre is created. This enables developers to accurately predict the tyre's performance without physically driving it.

## What does it mean for fleets?



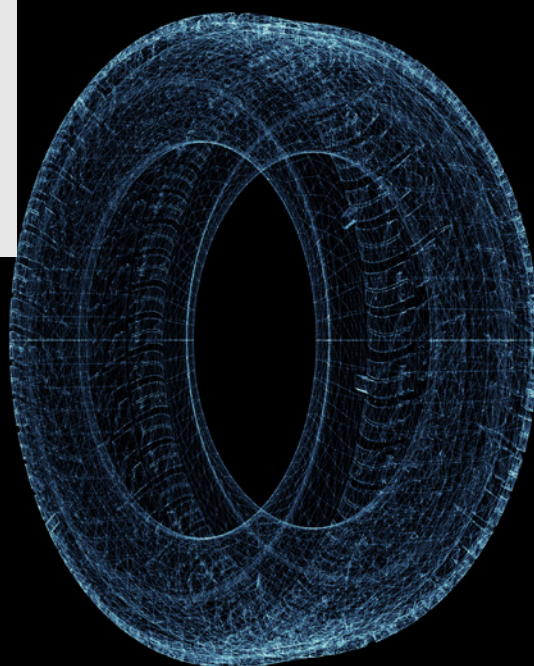
Virtual Tyre Development saves about 200 tyres on every project, so your tyres are coming from a more sustainable source.<sup>8</sup>



The time to market is cut by up to 50%, so powerful new performance enhancing tyres get to you sooner.<sup>7</sup>



Around 60% less raw materials and CO<sub>2</sub> emissions are required during the tyre development phase.<sup>8</sup>







## Digitised manual inspections

Many of the technologies discussed in this section rely on tyre sensors. However, there are potential tyre issues that may not be detected by a sensor and so a visual inspection performed by the driver can still be valuable.

The WEBFLEET Vehicle Check mobile app enables the driver to report any vehicle defect digitally, including tyre issues, reducing the time spent on vehicle inspections and removing time-consuming paperwork from the process. The fleet manager gets a real time notification and maintenance tasks can be triggered with a click.

### What does it mean for fleets?



By digitising a manual process, time can be used more efficiently and information is recorded and stored more accurately.



As regulations push fleets to increase the driver's responsibility for maintaining a safe vehicle, solutions like this can help you stay compliant easier.



Potential issues are detected at an earlier stage.

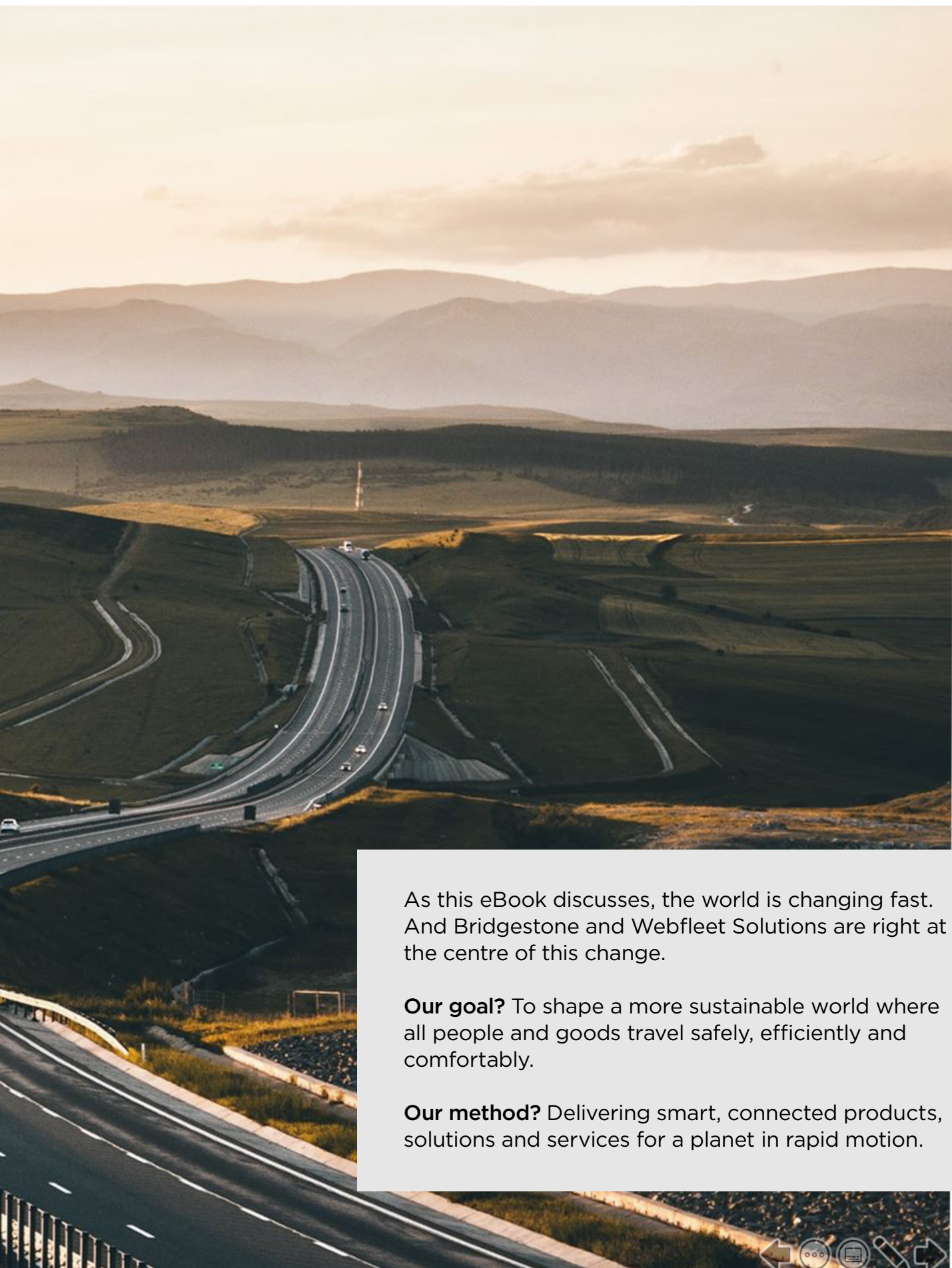




# Bridgestone and Webfleet Solutions

Shaping the future of mobility





As this eBook discusses, the world is changing fast. And Bridgestone and Webfleet Solutions are right at the centre of this change.

**Our goal?** To shape a more sustainable world where all people and goods travel safely, efficiently and comfortably.

**Our method?** Delivering smart, connected products, solutions and services for a planet in rapid motion.

# What we provide

We provide a constantly evolving suite of tyres, data-driven solutions and connected technologies, plus an extensive retail service and maintenance network.

This combination gives you control and visibility over your entire fleet operation - from the tyres on the road to the fuel in the tank or the charge level of the battery, the driver behind the wheel and the service you need in every location to keep your vehicles on the road.

You can rely on the support of our experts to help you take advantage of changing mobility trends and innovations, from electrification to digitisation, last mile delivery, new emissions standards and beyond.

The net results? Optimised safety, efficiency and sustainability and the fullest possible value from every kilometre you drive, today and tomorrow.



## All-in-one connected mobility solution

A fully integrated approach to mobility that maximises simplicity and efficiency for the end user. All your mobility needs - from tyres to maintenance services to fleet management and more - are met by the same, market-leading provider.



## Recognisable, trusted service in every region

Whatever the territory, you can access the same professional, high level of service via our extensive retail service and maintenance network.



## Data security and privacy

Our solutions are ISO/IEC 27001:2013 Certified. That means we meet the highest standards possible for data security in Europe. Even as the risk of threats to your data evolves, this standard evolves to ensure those threats are prevented. And that's the standard we apply to keeping your driver and vehicle data secure.





## Sources

- 1 Connected fleet services global study – PTOLEMUS Consulting Group (2018) \*Figure is based on an average mileage of 120,000km per year with 14 tyres costing EU400 per tyre at a lifetime of 90,000km.
- 2 Frost and Sullivan
- 3 Under-inflated tyres cause additional fuel consumption – Top Speed (2007)
- 4 Top 10 causes of commercial vehicle breakdowns – RAC Business
- 5 Figure is based on internal field evaluation and test conducted at Bridgestone's research and development facility
- 6 Based on Bridgestone internal data comparing Bridgestone premium summer tyres with and without ENLITEN Technology in the same tyre size (92Y 225/40R18 XL)
- 7 The simplest way to monitor tyre pressure for a more efficient fleet - Fleet Pulse
- 8 How Bridgestone's virtual tyre modelling is revolutionising tyre development – Bridgestone (2021)



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