Aiming to Realize Tire Light-weighting and New Levels of Comfort through the Accumulation of Technology

Significance of our initiatives

Striving to develop new tire technology can reduce the burden on the environment

Environmental performance, as seen in fuel-efficient tires, has an important role to play in underpinning the car-using society of the present day, and of the future. In the 1980s Yokohama Rubber began to undertake research on silica, developing silica compound technology that has been vital for achieving both fuel efficiency and good wet grip performance, and on which we have continue to focus over the past four decades. The eco-friendly DNA series, launched in Japan in 1998, was revolutionary, and we subsequently continued to attach great importance to eco performance, leading to the introduction of the BluEarth series from 2010 onwards. We have promoted the widespread adoption of fuel-efficient tires, and by FY2019 sales of fuel-efficient tires had grown to account for 90.1% of all sales of replacement summer tires in Japan.

In the future, we will continue to promote the adoption of products that can help to reduce the burden on the environment.

The tires of the future, which Yokohama Rubber's research is contributing to the development of

Saving resources by reducing tire weight by
Around 50%
(compared to conventional tire products)

Highest level rolling-resistance performance and wet grip performance
AAA-a*1

*1 Based on Japan's tire labeling system

A tireless striving to develop more advanced environmental and safety technologies

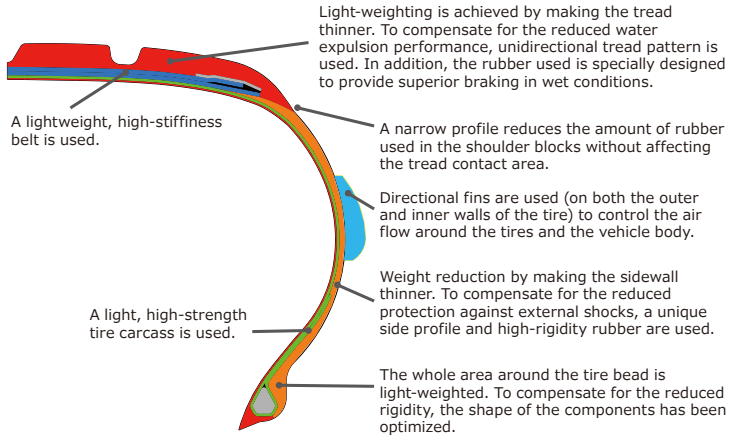
In producing sustainable tire products, it is vitally important to reduce the quantity of scarce resources that are used. Making tires lighter saves on resources, and also contributes to improved fuel efficiency by making the vehicle as a whole lighter. We are aiming to reduce tire weight by 50% compared to existing Yokohama Rubber tire products, and we are currently working on the development of ultra-lightweight tires. We are also undertaking research on tire fins that will reduce the air resistance of the vehicle as a whole.

In addition, in order to make going out in your car as enjoyable as possible, we are striving to create tires that provide good braking performance in the rain and on snow or ice.

For Yokohama Rubber, customer safety is our first priority, and we have used our advanced silica compound technology to produce a large number of different tire products that combine superior fuel efficiency with "Wet-a" (the highest level of wet grip performance under Japan's tire labeling system) performance. Braking performance is particularly important for studless tires. In 2018, Yokohama Rubber completed construction of Japan's largest indoor ice track testing facility, in Asahikawa City, Hokkaido, and we continue to work tirelessly to develop studless tires that can stop effectively even on slippery frozen road surfaces.

On any vehicle, the area of each tire that is actually in contact

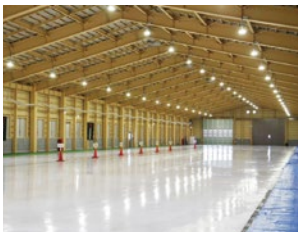
Ultra-lightweight concept tire (Announced in 2019)



Tread pattern

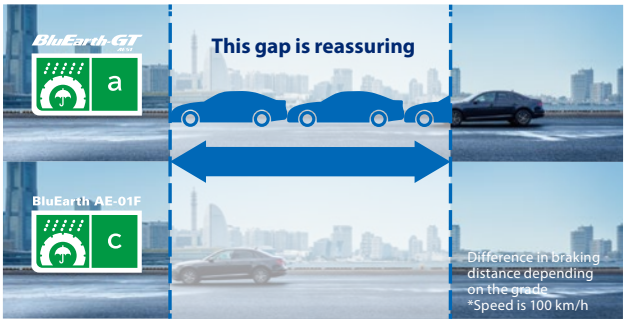
with the road at any given time is only about the size of a postcard. We aim to deliver high-performance tires that maximize vehicle performance and contribute to safe handling to as many customers as possible.

Yokohama Rubber's Tire Test Center of Hokkaido (TTCH) in Asahikawa City, Hokkaido



Ice track for indoor testing

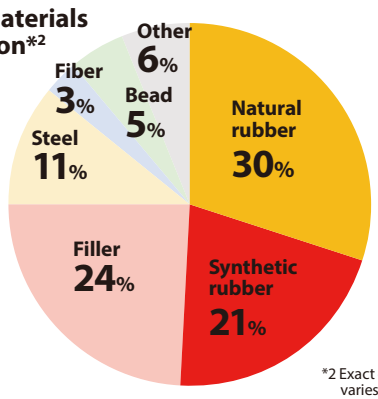
Difference in braking distance depending on the wet grip performance grade



We are challenging new innovative technologies through collaborative research

Natural rubber and synthetic rubber account for over half of the raw materials used to make a tire. By replacing petroleum-derived synthetic rubber – which accounts for a large share of a tire's total composition – with sustainable materials, it will be possible to reduce CO_2 emissions and make tire manufacturing more sustainable. For that purpose, new technologies are required, and we are working on bioproduction technology using cells and catalyst development utilizing data-driven learning. Production of isoprene by cell engineering has been developed in collaboration with National Research and Development Agency RIKEN and Zeon Corporation, and research on catalysts for production of butadiene by using data driven learning is also underway, in collaboration with the National Institute of Advanced Industrial Science and Technology (AIST) and the Research Association of High-Throughput Design and Development for Advanced Functional Materials (ADMAT).

Tire raw materials composition*2



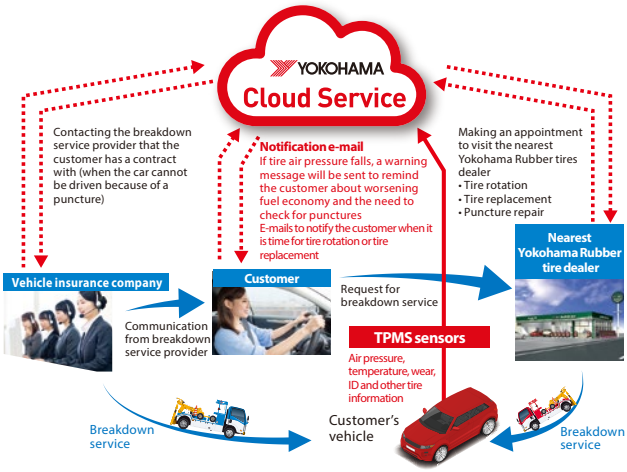
*2 Exact composition varies depending on tire size and model.

Creating tires that provide even more comfort

In the past, the main benchmarks for the comfort that tires provide have been quietness and how the ride feels to people in the vehicle. However, the automotive sector is now facing a period of dramatic change, of the kind that comes along only once a century or so, and the acronym CASE*3 has become a key concept. New technologies will be needed to meet the needs of the autonomous, electric vehicles of the future. Besides quietness and a comfortable ride, in the future tire manufacturers will also be working to eliminate the need for tire maintenance and to overcome the problems that users currently experience with tires. For example, electric vehicles are inherently very quiet, so tires for use on electric vehicles need to be even quieter than conventional tires; autonomous vehicles need tires that are resistant to punctures, and which can run flat if they do get a puncture.

*3 CASE: Connected, Autonomous, Shared & Services (or just Shared), Electric.

IoT-enabled tires of the future



Silent Ring
Silent Rings have sound-absorbent material attached to plastic bands, and function by being attached to the inside of the completed tire. They are not glued onto the tire, so puncture repair agents etc. can still be used. Silent Rings can be used with a tire speed rating of up to W class (i.e. up to 270 km/h).

Silent Foam
Sound-absorbent material is fixed in place by being glued to the inside of the tire. This is used on the tires originally fitted to each vehicle by the automotive manufacturer. Silent Foam can be used with a tire speed rating of up to Y class (i.e. up to 300 km/h).

Silent Foam Hook-and-Loop Fastener Concept Tire (currently under development)
With this technology, which is currently under development, Silent Foam is fixed in place using detachable hook-and-loop fasteners, which provide more flexibility in mounting, and can also be used for attaching other functional components, along with various other advantages such as allowing puncture repair agents to be used. This technology also provides the thermal resistance and strength that the tire manufacturing process requires.
*This is a collaborative development project with Kuraray Fastening Co., Ltd.

A further trend is the application of Internet of Things (IoT) technology to tires. Besides conventional TPMS*4 systems, research is now underway aimed at addressing the problems that people experience with tires, in line with future changes in car ownership models such as the rise of car-sharing, etc., by utilizing tire sensor based wear detection, road surface detection, and comprehensive cloud-based tire air pressure management, as well as tire maintenance services (including wear inspection and tire rotation management) that make use of digital tools, etc. With this in mind, Yokohama Rubber is working on an Intelligent Tire Concept that will provide new levels of comfort and peace of mind, through collaborative research with ALPS ALPINE CO., LTD. on advanced tire sensors for passenger vehicles.

*4 TPMS: Tire Pressure Monitoring System