

Bridgestone eyes fully recyclable tire

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Renewed focus on natural rubber, non-oil-based synthetics targets sustainable products by 2050.

In a few decades, the tires on your car might be made completely from renewable materials, with no oil being used.

At least that is what Bridgestone Corp. hopes for. The company is working on the concept of tires made from 100% sustainable materials and is looking to have a commercial version ready for market, by 2050.

Bridgestone is developing biomass alternatives for the crude oil now used to make synthetic rubbers and carbon black reinforcing materials for tires. It is also working to diversify the types of plants grown for production of natural rubber.

Ground up

Last summer, Bridgestone purchased roughly 113.7 hectares (281 acres) of land in the U.S. state of Arizona. It plans to soon use part of that land to grow guayule.

The plant is a perennial shrub native to Mexico that grows well in dry regions. Three years after the seedlings have been planted, the trunks and roots of the shrub can be harvested to extract natural rubber.

The world now relies on the Para rubber tree for natural rubber. This plant grows in the tropics, and roughly 90% of all rubber trees under cultivation are grown in Indonesia, Thailand and Malaysia.

"Because of this limited growing region, there is always the risk of a spike in rubber prices due to weather conditions," said Bridgestone research fellow Yoichi Ozawa.

From the standpoint of biodiversity, the practice of large-scale cutting down of rubber trees is also a subject of criticism.

As such, Bridgestone is seeking alternatives for natural rubber, and one plan is to make active use of the guayule shrub. But this still has a number of problems.

One is that the rubber obtained from the plant using conventional solvent-extraction techniques contains an equal amount of resin, so a more advanced removal technique using organic solvents is needed. Also, improved strains of guayule must be developed that are more resistant to weather variations and lend themselves better to mass production.

Meanwhile, Bridgestone has also begun researching ways to extract natural rubber from the Russian dandelion plant, which grows in temperate zones.

Like the guayule shrub, the Russian dandelion grows in a different environment than the rubber tree, so Bridgestone can spread risk by also growing these plants for natural rubber.

However, this path is anything but easy to take. "There is no standard method of cultivation, so we need to prepare even the seeds ourselves," Ozawa said.

Bridgestone will conduct tests with Russian dandelion in 2014 and 2015 to investigate factors like strength and decide after that whether to seriously pursue rubber production with the plant.

Beyond sustainable

Bridgestone is also looking anew at synthetic rubber, which is traditionally made from crude oil but can also be made from biomass.

The company is progressing with the development of a technology using high-performance catalysts to make the raw material butadiene from bioethanol. The goal is to operate a pilot plant starting in 2015.

Bridgestone is also studying ways to use biomass to make the carbon black and rubber compounding agents that are used for the reinforcing fibers and stiffeners that are added to tires.

By combining all of these technologies, the company can achieve its concept of a 100% sustainable materials tire.

But in addition to developing new materials, Bridgestone is also interested in reducing the amounts of materials used in its tires, and making more efficient use of resources.

That is why the company is promoting technologies for "half-weight tires" that use half the amount of materials but are just as strong as regular tires, and why it has become directly involved in the business of tire retreading services.

Tires that are reused by being retreaded consume less than one-third the amount of materials of new tires. Bridgestone spent roughly 130 billion yen (\$1.4 billion) in 2007 to acquire the U.S. company Bandag Inc. and has since expanded that company's tire-retreading business to 80 countries.

For Bridgestone, environmental management is about expanding and diversifying the use of renewable resources and applying them to all of its products.

"If we as a company are to contribute to the achievement of a sustainable society, then we ourselves must become a sustainable enterprise," said Chairman Shoshi Arakawa.

Although those goals will consume time and money, they will give back to the company in the form of future revenues and profits.

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