

Reprinted from **Real Answers**

Why can't a plant
be more like a tree?

Special Edition Three

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All chemical processes that produce synthetic rubber are constantly monitored and controlled by computer.

Why can't a plant be more like a tree

Huh? Maybe we should phrase it this way: Why can't a synthetic rubber "plant" be more like a rubber "tree"?

We learned last time where the "natural" rubber part of Bridgestone truck and bus radial tires comes from. This time, we visited Firestone Polymers, LLC, in Lake Charles, Louisiana, to find out more about the "synthetic" material that goes into your tires.





What's the difference between synthetic and natural rubber?

John Stofira, Chief Process Engineer:

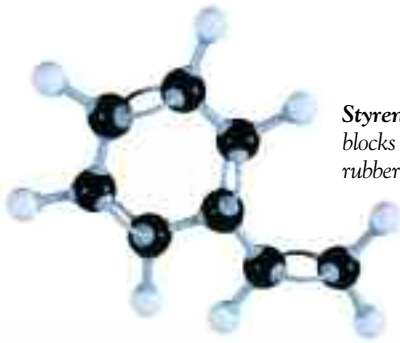
“Natural rubber is a compound

called ‘polyisoprene,’ made by rubber trees. Most of the synthetic rubber we produce here is made of styrene and butadiene, which we call ‘styrene butadiene rubber.’”

Isoprene is the building block of natural rubber produced by trees.



Styrene is one of the building blocks of the synthetic rubber used in tires.



Butadiene and styrene are combined in various formulations and in varying structures to produce synthetic rubber with customized properties.



How did synthetic rubber production get started here at Lake Charles?

“This plant opened in 1942. During the Second World War, our access to natural rubber in Southeast Asia was cut off, but obviously, we still needed rubber.

“The United States went on a crash program to make rubber synthetically from materials readily available here. We’re very close to the Texas oil fields, and the styrene and butadiene we use in synthetic rubber can both be made from oil.”

Why not make the same kind of rubber the tree does?

“Rubber trees do a very good job of making natural rubber. We can make natural rubber synthetically, but the tree does a very good job. It would be somewhat difficult for us to duplicate what the tree already does. Also, butadiene is more readily available than isoprene.

“By making rubber synthetically, we have the advantage of being able to tailor its characteristics to produce very specific performance.”

What sorts of performance?

“Natural rubber tends to be really good at certain kinds of things, like tear resistance and wear, but less good at reducing rolling resistance.

“With synthetic, because we’re making rubber that’s exactly the way we want it, we can create rubber that can be fuel efficient, have a high affinity for carbon black and other components that go into the tire, process more easily and all sorts of other desirable characteristics.

“With natural rubber, you pretty much get what you get.

“With two basic components, styrene and butadiene, we can vary the amounts of each, how they’re linked to each other and the overall chemical structure of the result. That gives us lots of different varieties, each with different capabilities.

“We can make about 40 different kinds of synthetic rubber, and although most of what we produce is used in tires, we also make special types for other applications.”

How is the rubber actually made?

“We dissolve the styrene and butadiene in a solvent, and use a catalyst that causes the two to react and link up into long chains.

“All the raw materials are liquids, and they’re put into big tanks at fairly high pressure. Everything has to be of incredibly high purity, well over 99 percent. A tiny bit of water or air or oxygen can ruin a batch.



“Everything, the mix, the temperature, pressure, and so on, is monitored and controlled by computer. Operators watch the whole process on computer screens, and can open and close valves and pump tank contents from place to place by remote control.”

How long does it take to make a batch?

“It actually takes just a few minutes for the reaction to be complete. The result is something that resembles rubber cement, with the synthetic rubber dissolved in the solvent.

“The next thing we do is recover the solvent, which we re-use over and over again. What remains is the synthetic rubber.”

How is that done?

“We evaporate the solvent and coagulate the rubber by adding hot water. The solvent vapor passes through towers, sort of like the ones at an oil refinery, to be recovered and purified so it can be re-used.

“We then go through several stages to remove as much of the water from the rubber as possible.”

What does the rubber look like?

“It’s called ‘crumb,’ because that’s what it looks like. It’s white and a little bit sticky.”



We’ve seen huge bales of natural rubber at the tire plant. How is synthetic rubber handled?

Carl Talley,
Packaging Coordinator:

“Most of our product is put up in 75 lb bales. At the end of the line, we compress it into big blocks – or bales – which are wrapped in plastic film and packed into special containers for shipping.”



How much synthetic rubber do you make?

“We produce about 35 to 38 million pounds of synthetic rubber each month, or about 400 million pounds a year.

“About 90 percent of that goes to tire plants, and the rest goes into things as varied as golf balls, shoe soles, sporting goods, the cove molding that goes around walls next to floors, floor tiles, and even paper plates.

“Roughly 60 percent of our product is used here in the United States, while the rest goes to facilities in Canada, South America, Mexico, Europe – even to Bridgestone plants in Japan.”

We saw the letters “VPP” on your sign out front. What’s that stand for?

“OSHA, the United States Occupational Safety and Health Administration, awarded us a ‘VPP STAR’ designation as part of its Voluntary Protection Program (which is the ‘VPP’ part). ‘STAR’ stands for ‘Safety Through Accountability and Recognition.’

“We were the very first synthetic rubber plant in the United States to be awarded this distinction. It’s a very prestigious award, indicating we take safety very seriously, and involve every one of our teammates in it.

“OSHA made the award on July 11, 2006, and we’re very proud of it. We have 300 teammates here, and nothing is more important than their safety and that of the community in which we work.”

Any special plans for the future?

John Stofira: “We’re constantly improving our processes and equipment. We spend millions of dollars every year on capital improvements. Right now, for example, we’re installing a whole new system of control computers. We’re improving safety, productivity and capacity – every day.” 