

SOY PRODUCTS FOR RUBBER COMPOUNDS

Soy products perform as process aids and reinforcing fillers in rubber compounds with a sustainability advantage.

RUBBER INDUSTRY OVERVIEW

The rubber industry value chain is complex, with a number of large producers of elastomers; a range of large to small suppliers of rubber compound ingredients; and many compounders, fabricators and original equipment manufacturers using rubber. World consumption of rubber exceeds 25 million metric tons.

RUBBER MARKET SEGMENTS

- Pneumatic tire compounds
- Tire retreading
- Extruded rubber products
- Molded goods
- Power transmission belts
- Conveyor and flat-transmission belting
- Hoses
- Open-cell sponge rubber
- Rubber-covered rolls
- Footwear soles and heels
- Wire and cable
- Elastomeric seals
- Coated fabrics
- Roofing and liner membranes

ESTABLISHED USES

- Vulcanized vegetable oil (including soy) as an extender and rubber substitute results in improved ozone resistance and improved flow properties.
- Epoxidized soy oil – plasticizer/stabilizer in plastics and rubber.

TIRE APPLICATIONS

Developments are underway that could help the environment and consumers alike by reducing the amount of petroleum-based oil used in tires while simultaneously extending tread life. Tests have shown that using soy oil in tires can potentially

increase tread life by 10 percent while reducing the use of petroleum-based oil. Improved mixing capabilities in the manufacturing process have been demonstrated, and rubber compounds made with soy oil blend more easily with the silica used in building tires. This can improve plant efficiency and reduce energy consumption and greenhouse gas emissions.

Bridgestone created a new agricultural concept tire for large, four-wheel drive tractors with eight tires. Soy oil constitutes more than 10 percent of the 900-pound farm tire.

At least two tire companies are currently developing or testing tires made with soybean oil. Goodyear has a project, sponsored by USB, which replaces petroleum-based oils in tire tread compounds and is testing tires for passenger cars. Bridgestone has developed and displayed a new agricultural concept tire for large, four-wheel drive tractors. Soybean oil constitutes more than 10 percent of the 900-pound Firestone farm tire.





SOY PRODUCTS FOR RUBBER COMPOUNDS

TECHNOLOGY

Most elastomers require processing aids and plasticizers to reduce the internal friction generated during mixing of the rubber compound. With lower internal friction, compounds incorporate fillers with less power consumption, a lesser tendency to scorch and an ability to process more smoothly. Rubber compounds often require reinforcing materials to improve their physical properties, and fillers can potentially reduce the net cost of a compound.

CURRENT RESEARCH STATUS

Current and recently completed research projects include:

- Rubber uses for polymerized soy oil
- Modified soy hulls for rubber reinforcement
- Soy oil to replace petroleum oils in extended rubber
- Soy-based oil polymers in rubber compounds
- Soy-based rubber and rubber composites
- Soy-based rubber automotive seals
- Chemical bonding of free sulfur in soy-vulcanized compound
- Soy-based reactive materials for tires and elastomers
- Epoxidized soy oil in conjugated diene elastomers and tires
- Soy oils and polyols in high-performance elastomeric compounds



DRIVING ISSUES

Rubber and tire producers are replacing extender oils containing polycyclic aromatic components with environmentally friendly oils in response to sustainability strategic initiatives and the European Union directive banning high-aromatic oils. The primary oil used has traditionally been Distillate Aromatic Extracts (DAE), due to its solvency and ability to vulcanize rubber.

DAE, however, is suspected to have carcinogenic effects. Only oils with low levels of Polycyclic Aromatic Hydrocarbons (PAH) are allowed in tires manufactured in or imported into the EU, as of 2010.

ABOUT USB

The 69 farmer-directors of USB oversee the investments of the soy checkoff to maximize profit opportunities for all U.S. soybean farmers. These volunteers invest and leverage checkoff funds to increase the value of U.S. soy meal and oil, to ensure U.S. soybean farmers and their customers have the freedom and infrastructure to operate, and to meet the needs of U.S. soy's customers. As stipulated in the federal Soybean Promotion, Research and Consumer Information Act, the USDA Agricultural Marketing Service has oversight responsibilities for USB and the soy checkoff.

FOR MORE INFORMATION, VISIT: SOYNEWUSES.ORG

