A Fine Job

Cryogenic preprocessing and centrifugal screening create super-fine rubber powders that spawn new applications.

Lehigh Technologies, based in Naples, Fla., combines a patented cryogenic preprocessing technique and a centrifugal screener from Kason, Millburn, N.J., to turn recycled tire granules into fine rubber powders. The company’s 80- to 140-mesh (177- to 104-microns) fine powders and its super fine powders, 140 mesh (104 microns) and finer, are opening new applications in sealants and automotive undercoatings. These materials are applied using fine orifice nozzles that would clog if larger particles were used.

The smaller the particle size, the more rubber powder can be added to tires and recaps. Finer particles present a larger surface area for bonding and, therefore, lower the risk of delamination. One pound of recycled rubber added to a tire saves almost 1 gallon of crude oil, the amount required to produce an equal amount of virgin rubber.

Production Process
Lehigh's manufacturing site in Tucker, Ga., is one of the largest and most-advanced rubber powder manufacturing facilities in the world. Here, the company’s proprietary technology is combined with commercially available industrial equipment to produce consistently sized rubber particles measuring 40 mesh (420 microns) and smaller that are sold under Lehigh’s Polydyne label.

The company’s raw stock is 100 percent recycled content, granulated rubber obtained from tire processors in sizes rang-
material is stored in bins.

Upon demand, stock is drawn from the bins and fed by insulated screw conveyor into the liquid-nitrogen-cooled cryogenic chamber where temperatures, typically between -100 Fahrenheit to -130 Fahrenheit (-73 Celsius to -90 Celsius), is regulated based on the particle size desired. Freezing turns the rubber granules into a glass-like state that fractures easily during grinding in a high-speed attrition mill. After size-reduction, the material passes through a rotary drum magnet that removes steel belting that was freed during the grinding process.

**SIMULTANEOUS JOBS**

At this stage, the powder exhibits an oily texture and is electrostatically charged, causing the particles to agglomerate and making them difficult to screen. A flow aid, such as finely ground talc or fumed silica, is metered in, and the mixture is screw-fed into a Kason model MO-CS Centri-Sifter centrifugal screener that blends the two, causing the rubber particles to separate.

Inside the screeners' horizontally oriented cylindrical chamber, rotating helical paddles break up soft agglomerates and continuously propel the material against a 20- to 30-mesh (84- to 589-microns) woven nylon monofilament screen. The centrifugal force accelerates the on-size particles through the apertures and scalps any fiber from the tire core. The fibers ball up like cotton and are discharged through the open end of the screen cylinder, along with any oversized rubber and residual steel from the tires.

"The Centri-Sifter screener, which we purchased from Cino Equipment Co., Berkeley Heights, N.J., does everything simultaneously, which is why we use this equipment," Meckert says.

The Centri-Sifter centrifugal screeners'
Our growing production will ensure a good supply of powder for our customers and enable them to lower their production costs by increasing the amount of recycled material in their products. - Bill Meckert, Lehigh

ability to work efficiently within the demanding production environment contributes to the quality of powder processed on the line. Its heavy-duty construction makes it well suited for continuous in-line operations, according to Lehigh. The unit is compact and operates quietly with vibration-free action. A large access door facilitates cleaning, and screens can be changed in less than two minutes.

THE FINAL STEP
Following the Centri-Sifter screen, the rubber powder is discharged into a proprietary tumbler screening process that classifies the material. According to Lehigh, the line produces 2,500 pounds (1,134 kilograms) per hour of powder in sizes that range from 40 to 240 mesh, depending on the application.

Currently, products are shipped only within the United States, but at the request of Lehigh's globally diverse customer base, the company will begin shipping its products internationally.

“Our growing production will ensure a good supply of powder for our customers and enable them to lower their production costs by increasing the amount of recycled material in their products,” Meckert says.

In the future, Lehigh foresees blending rubber with plastics to increase their durability and flexibility as well as to improve their UV resistance so they are less susceptible to brittleness and cracking from sunlight. This application, which is still in the embryonic stage, will require even finer rubber powders than are now being produced, and, according to Meckert, Lehigh Technology's centrifugal screeners will adapt to the new requirements with a simple change of screens.

This feature was submitted on behalf of Lehigh Technologies (www.leightech.com) and Kason Corp. (www.kason.com).

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<table>
<thead>
<tr>
<th>Bales as shown:</th>
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<tr>
<td>Size: 8&quot; x 8&quot; x 10&quot; (Variable)</td>
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<tr>
<td>Weight: 40 lbs.</td>
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<tr>
<td>Density: 75-90 lbs./cu.ft.</td>
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