

# Recycling Rubber into rCB

## New Committee to Address Need for Standards

By Cicely Enright

**Worldwide, one billion tires become scrap each year when they're no longer fit for vehicle use.**

Many countries now ban waste tires from landfills, although there are mountains of such tires. But recycling channels exist, and end-of-life tires can be a fuel source for cement kilns and power plants. Shredded or ground tires can reinforce embankments and cushion running tracks. Whole tires can start a wall or a building.

These tires can also be reworked into recovered carbon black. To ensure that rCB is properly used, industry stakeholders have convened to develop property and performance standards in a new ASTM committee on recovered carbon black (D36). The new committee formed because ASTM members saw a need to address rCB separately from existing groups.

"Since recovered carbon black is not the same as carbon black, it is important for our [rCB] industry to start standing on our own feet and acknowledging the differences from normal carbon black," says Pieter ter Haar, vice chairman of the new committee and head of research and development and quality assurance at rCB producer Carbon Clean Tech in Germany.

The committee chairman, Anthony Thornton, director of technical information at Micromeritics Instrument Corp., says, "While we will be drawing heavily on existing ASTM standards, such as those from Committee D24 on Carbon Black, we will be developing others specific to the needs of the many industries

producing and using recovered carbon black. Committee D36 already has the expertise in its membership to accomplish this task ahead of us, though we welcome any others who wish to contribute to this important work."

### THE NEW COMMITTEE

ASTM members have long worked on standards for carbon black and related areas. The carbon black committee (D24), which organized in 1956, has responsibility for 40 standards. Until D36 came into being, D24 housed a sustainability subcommittee that included rCB. ASTM's committee on rubber and rubber-like materials (D11) organized in 1912. The D11 committee oversees more than 225 standards, and includes members interested in rCB.

Now, with a dedicated committee for rCB, more focus will be put on the material's unique properties and testing requirements. The work needs to be done now, according to Chris Norris, membership secretary for the new group, who is analytical services manager at ARTIS, a U.K.-based materials consulting firm specializing in elastomer technology. "Standards are urgently required for rCB to give potential users some confidence in the quality and consistency of the material they are buying," he says.

“Conventional carbon black tests do not effectively predict how rCB performs in rubber applications, so this is one area of focus.”

Planning for the new committee began last year. In December 2016, representatives from industry, associations, and the ASTM committees on rubber and carbon black, agreed on the scope for the new group: to promote knowledge, stimulate research, and develop standards for rCB, including materials recovered by a decomposition process of scrap tires and other scrap rubber components.

D36 will consider more than two dozen relevant standards from D24 and begin the process of developing similar standards as applied to rCB. The committee will also look at D11 standards for possible adaptation to rCB. Topics include standards for:

- Terminology,
- Structure,
- Surface area and related properties,
- Components,
- Pellet properties,
- Sampling and analysis,
- Microscopy, and
- Reference materials.

Standards from the rubber committee may also provide starting points for rCB procedures.

“Currently used test methods are being adopted from the D24 carbon black committee, and many may not be suitable for recovered carbon black as they do not show the predicted correlation necessary in order to make them suitable industry test methods,” says ter Haar. “End users expect the industry to step up and develop test methods to better predict in-application behavior.” With standard tests, producers can indicate the exact quality of their material.

“Conventional carbon black tests do not effectively predict how rCB performs in rubber applications, so this is one area of focus,” Norris says. “We are also reviewing which current carbon black tests are appropriate, those that may need some method development for rCB, and new tests where required.”

## Pyrolysis: Making Recovered Carbon Black

How is recovered carbon black made into pellets that are useful for manufacturing?

Pyrolysis is a method commonly applied to process used rubber from tires or conveyor belts into rCB and other parts. Tires are a typical feedstock for this purpose because many regulations ban scrap tires from landfills, and recycling channels exist that make them easily available.

As defined by ASTM’s petroleum products committee (D02), pyrolysis is “chemical decomposition of organic materials by heating in the absence of oxygen.” Pyrolysis uses high heat — between 450 and 650oC — in an oxygen-free environment to break down, or roast, the material into gas, oils, and solids. The gas and oils can become fuel or find other industrial applications. And the solids are

steel and/or char. This char can be converted into recovered carbon black by proper cleaning, size reduction, and pelletizing.

Some pyrolysis processes are said to be efficient enough to leave only 1 to 2 percent waste behind.

The rCB may then be an option for use in belts, seals, gaskets, and molded parts. Standards will aid in the possibility of rCB partially replacing carbon black in rubber, plastics, ink, or paints.



Ter Haar adds that existing pellet property standards may take priority as they may need only minor revisions to be applicable to rCB. He says, "It will be very important to work our way back up from the end use and see how we can find test methods that will allow us to offer better correlations between recovered carbon black and in-application behavior."

#### MARCH MEETING

The new committee structure includes technical subcommittees on rCB, other recovered materials, nomenclature, environmental safety and sustainability. At its March 22 meeting in conjunction with the European Tyre Recycling Association conference in Brussels, Belgium, the group will focus on the primary rCB subcommittee.

Meetings are also scheduled this year at the June committee week in Toronto, Ontario, when both Committees D11 and D24 will be meeting.

"ASTM has proven itself yet again to be leader when it comes to standardization in this field by being the first to adopt recovered carbon black as an independent industry and offering a lot of support during this process," says ter Haar.

#### FOR MORE INFORMATION

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# Well-Oiled Machines

As the lifeblood of most machinery, lubricants — and the standards that guide and measure their effectiveness — **support the world’s mechanized demands.**

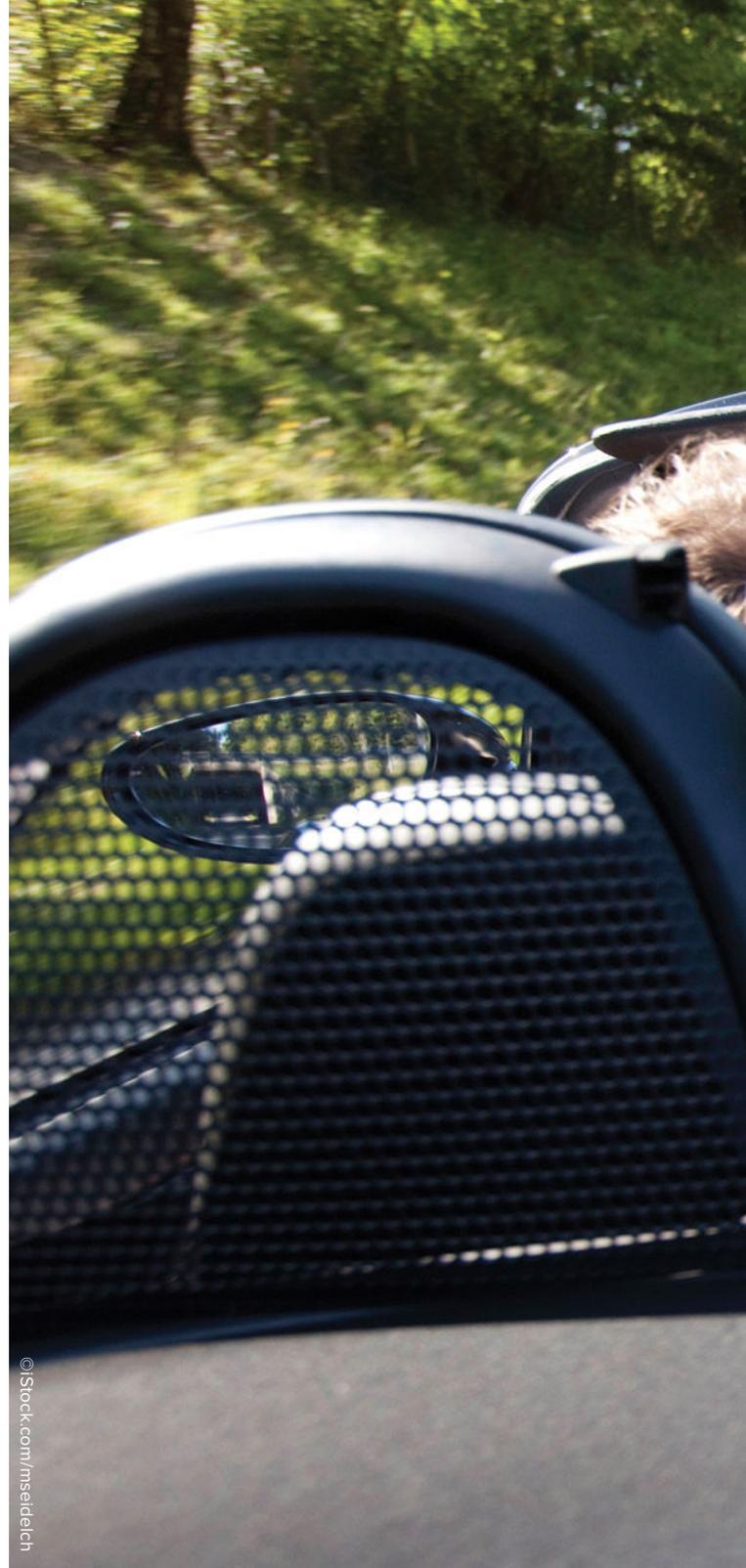
By Rick Carter

It’s safe to say that the world’s engines, turbines, and many other types of machinery run on lubrication first. Without lubricants, machines could not operate — friction and heat buildup among moving parts would, at best, cause them to seize and stop or, worse, break apart.

The nonstop need to protect machinery from friction and heat has created a global market for lubrication products of about \$116 billion (2015). It has also created worldwide teams of researchers and practitioners who work to improve lubricants that boost machinery reliability and efficiency, and reduce operational costs.

ASTM International has long been at the forefront of creating standards for lubricant manufacturers, testers, and end users. Since 1904, the committee on petroleum products, liquid fuels, and lubricants (D02) has developed 220 lubricant-specific standards and test methods.

Though the committee defines a lubricant as “any material interposed between two surfaces that reduces friction or wear between them,” traditional oils and greases get the most attention. But as with the D02 standards for fuels (covered in the Nov./Dec. 2016 issue of *Standardization*



*News*), standards for lubricants play an important behind-the-scenes role. Whatever recognition there is for the countless hours of research and testing undertaken to ensure that lubricant products perform flawlessly, it generally occurs long before the products enter service.

## THE AUTOMOTIVE INDUSTRY: A KEY DRIVER

Perhaps no industry is more linked to advances in lubrication technology than the world’s automotive sector. Engine oils are now on the front line of automakers’ efforts to gain greater fuel efficiency. New engine designs, for example, will soon call for oils that are much lighter in weight (viscosity) than