Cooper participates in tire research and development (R&D) activities to continue to improve tire performance, safety, service and return on investment. Many initiatives focus on R&D to make tires more sustainable, such as designs that improve fuel economy by reducing tire weight and rolling resistance.
COLLABORATION AND PARTNERSHIPS

Cooper collaborates with a number of entities and partners, including those listed below, on tire raw materials and design, training, regulatory matters, scrap tire management and other sustainability topics.

- Agricultural Research Service (ARS) of the U.S. Department of Agriculture (USDA)
- American Chemical Society
- American Society for Testing and Materials
- Arizona State University (ASU)
- The British Tyre Manufacturers’ Association
- The Cámara Nacional de la Industria Hulera (The Mexico National Chamber of the Rubber Industry - CNIH)
- Center for Tire Research
- Cooperative Approved Tire List
- Cornell University
- The European Tyre & Rubber Manufacturers’ Association (ETRMA)
- Global Technical Regulations for Tires
- Harbin University of Science and Technology (Heilongjiang Province, China)
- Industrias Negromex S.A. de C.V.
- Industrial Research Institute
- The International Rubber Study Group
- International Standards Organization
- The International Tire Exhibition & Conference
- National Highway Traffic Safety Administration
- The Ohio State University (OSU)
- PanAridus
- PENRA (The Program of Excellence in Natural Rubber Alternatives)
- The (U.S.) Rubber Manufacturers Association (RMA)
- Society of Automotive Engineers
- The Tire and Rubber Association of Canada
- Tire Society
- The University of Arkansas
- University of Toronto
- U.S. Department of Energy (U.S. DOE)
- The World Business Council on Sustainable Development (WBCSD)

Specific projects include:
- Cooper works with the U.S. tire industry through the RMA to develop industry standards and statistics, participate in legislative and regulatory developments, educate consumers on proper tire care and safety, and promote the responsible management of scrap tires, including developing markets that use recycled rubber.
- Cooper and the Mexico tire industry are partnering through the CNIH on developing a scrap tire management plan for Mexico.
- Cooper is a member of the WBCSD, and participates in the Tire Industry Project to identify and address the potential health and environmental impacts of materials associated with tire making and use. While work on the project continues, the project currently focuses on:

  - Understanding the properties, fate and impacts of particles generated by the interaction between tires and pavements during tire use
  - Safely developing and using nanomaterials in tires
  - Working to encourage effective scrap tire management

A summary of the WBCSD work can be found at www.wbcsd.org/work-program/sector-projects/tires.aspx.

Cooper and our public and private sector partners have received several grants over the past few years for research to develop more sustainable tires and rubber sources. This research was ongoing in 2014 (see pages 20-22 for details).
RESEARCH AND DEVELOPMENT

Approach

Cooper directs its R&D activities toward product development, performance and operating efficiency. We conduct extensive testing of current tire lines, as well as new concepts in tire design, construction and materials. Additionally, Cooper continues to design and develop specialized equipment to fit the precise needs of its manufacturing and quality control requirements.

Cooper is increasing our commitment to R&D, as evidenced by our expanded and new facilities, such as the new Asia Technical Center (ATC) and Global Technical Center (GTC) that opened in 2014. The Asia Technical Center (ATC) is located in Kunshan, China, on the site of the Cooper Kunshan tire manufacturing plant, approximately 30 miles from Shanghai. The ATC was relocated to Kunshan from Shanghai to a new facility constructed specifically for Cooper’s R&D activities. It features state-of-the-art testing equipment and expanded research and development capabilities focused on designing and developing new passenger and truck tires primarily for China and the Asia market.

The GTC is a global center of excellence for tire science and technology, advanced technology and innovation technology located on our headquarters campus. The GTC will have a dedicated R&D team focused on exploring such areas as nanotechnology and new polymers and compounds as well as reinforcements.

With the GTC, we are building on our already strong capabilities to pursue the newest technologies to drive our business—and perhaps the tire industry as a whole—into the future. Our focus is on developing “ready-to-use” advanced technologies that help us expedite the product development cycle and allow Cooper to create innovations at the GTC and deploy them to meet regional customer and market needs around the world, helping us stay ahead of the curve in a very competitive tire industry.

We are able to develop and launch world-class products at a rapid pace, continuing to emphasize enhanced tire performance, lightweight tire materials, rolling resistance and fuel economy, wet and dry grip, and reduced tire and vehicle noise.

TECHNOLOGY INVESTMENT = AWARD WINNING NEW PRODUCTS

Cooper Zeon RS3-A a Consumers Digest Best Buy... again! January 2015

Overland Journal awarded the Cooper Discoverer A/T3 its Editor’s Choice and Value Award Summer 2014

The CS5 Touring tire won a 2014 GOOD DESIGN™ Award from the Chicago Museum of Architecture and Design and the European Centre for Architecture Art Design and Urban Studies December 2014

The Discoverer A/TW and the Discoverer SRX received “recommended” ratings from a popular national consumer ratings magazine November 2014

The Discoverer SRX received the 2014 SEMA New Products Award Runner-Up November 2014
SUSTAINABLE PRODUCT INNOVATION
Guayule Concept Tires Now Being Tested

In previous years, we have reported on the project with PanAridus, Arizona State University (ASU) and the Agricultural Research Service (ARS) of the U.S. Department of Agriculture (USDA) to conduct research on developing the guayule (pronounced why-YOU-lee) plant as an alternative natural rubber source. This research is funded by a $6.9 million Biomass Research and Development Initiative (BRDI) grant from the USDA that began in 2012 and will end in the second quarter of 2017.

The purpose of the grant is to conduct research to develop enhanced manufacturing processes for the production of solid rubber from the guayule plant as a biomaterial for tire applications, as well as evaluating the plant’s residual biomass for fuel applications. The consortium aims to harness biopolymers extracted from guayule as a replacement for synthetic rubbers and Hevea natural rubber used in the production of tires. It is also focused on genomic and agronomic development of guayule and the sustainability impact these biomaterial and bioenergy industries would have on the American Southwest, where guayule is grown.

In 2014, Cooper completed tire builds using rubber derived from guayule plants and new guayule-related materials. The tires are being evaluated by Cooper’s technical team using rigorous wheel, road and track tests. The tests are guiding Cooper to maximize the benefit of guayule in tire components.

Cooper’s progress in tire technology under the grant has been aided by PanAridus’ success in manufacturing rubber using improved strains of guayule and deploying superior rubber extraction technology. Cooper, PanAridus and USDA-ARS have worked closely to identify key variables impacting rubber quality and controlling these factors during the rubber manufacturing process, resulting in compounds with properties that behave more like Hevea natural rubber than guayule isolated from other processes.

In addition to the advances in rubber manufacturing and tire technology, consortium members USDA-ARS and Cornell University also reported significant progress in defining the guayule genome. Scientists may eventually be able to identify genes that can be tuned to improve qualities such as rubber yield, plant size, drought tolerance and other positive characteristics. Related advances have also been made in agronomics by consortium member USDA-ARS, including irrigation and direct seeding. These studies will help determine optimum conditions under which farmers can grow guayule crops to produce quantities sufficient for commercial use. ASU is evaluating the social, economic and environmental impact of the grant activities on all stakeholders with a focus on sustainable business practices.

Sustainability Team Member

David Shu
Environmental Health and Safety Manager
Kunshan, China (CKT), Tire Manufacturing Plant

On the job and off the job, David Shu is dedicated to protecting the environment. At CKT, David serves as Environmental Health and Safety Manager, protecting the environment and ensuring that CKT complies with all legal and regulatory requirements.

David has been on the job at CKT in this role for nearly two years, but in his time off the job he is an active volunteer for the Environment Protection Welfare Organization and has worked on projects such as Earth Day and Green Riding, focused on green lifestyles and energy savings.

David graduated from Nanjing University with a bachelor’s degree in environmental science and engineering, and before joining Cooper he served as the Environmental, Health and Safety Engineer, Supervisor and Manager in a manufacturing facility for 12 years.

In his position at Cooper, David has worked on several cross functional projects to generate environmental improvements. For example, the plant has replaced some fluorescent lamps with LED energy saving lamps, and the facility converted from a natural gas boiler to generate steam to sourcing excess steam from an external, local chemical company. The plant is currently working on using battery powered vehicles in the factory.

David believes that every day is an opportunity to improve and to meet the company’s sustainability goals. He rates his biggest accomplishment in sustainability as waste reduction, particularly waste going to landfills. CKT does not put any tire scrap into the landfill, and total waste has been reduced by more than 50 percent. Going forward, David and the facility will focus on further improvements in waste reduction through recycling, reuse and/or recovery.
Cooper Exceeds Targets for Prototype Fuel-Efficient Tires

Cooper has completed work under a $1.5 million government grant to develop advanced tire technology aimed at increasing vehicle fuel efficiency. The grant, awarded by the U.S. Department of Energy (DOE) Office of Energy Efficiency and Renewable Energy, called for Cooper to develop technology for light vehicle tires that delivered a minimum 3 percent improvement in vehicle fuel efficiency while lowering average tire weight by at least 20 percent, all without sacrificing performance.

Cooper was successful in developing technologies that exceeded the project's goals, delivering an average fuel efficiency improvement of 5.5 percent and weight reduction ranging from 23 percent to 37 percent in concept tires. The grant period began in late 2011 and continued through the end of 2014. Tire development work under the grant was done at Cooper's North America and Global Technical Centers.

While the technical challenges presented by this program were significant, Cooper exceeded the vehicle fuel efficiency improvement goal by developing a product with more than 30 percent lower rolling resistance. Reducing tire weight by a minimum of 20 percent required making a product that is five to six pounds lighter than the baseline 26-pound tire. All of this was accomplished without any trade-offs in performance or durability.

Cooper's innovative approach was to develop a new energy efficient tire profile and design in combination with an ultra lightweight tire construction. The process utilized innovative materials not typically used in tires today. In all, we developed and evaluated six new technologies as part of the program's first phase. We also evaluated the holistic impact of putting all of these technologies into a concept tire in the program's second phase. Combining these advancements allowed Cooper to reach and exceed the grant's aggressive goals.

As a result of the grant work, Cooper has already incorporated new tire modeling technology into its development process and is evaluating long wearing and fuel efficient tread compound technology for use in future tires for the replacement and original equipment markets. Other technologies are being further developed for potential commercial applications in the future. While we have more work to do to fully assess commercial viability of some of these new features, we certainly have taken leaps forward in developing tire technologies with strong potential for consumer benefit.
EcoCAR 2

For more than 25 years, the U.S. DOE has sponsored collegiate Advanced Vehicle Technology Competitions (AVTC) in partnership with the North American auto industry. These competitions stimulate the development of advanced propulsion and alternative fuel technologies. And, by engaging undergraduate and graduate students, AVTCs are a training ground for the next generation of automotive engineers.

EcoCAR 2 is an AVTC that kicked off in April 2011. Over the course of three years, EcoCAR 2 teams worked to reduce the environmental impact of a Chevrolet Malibu by minimizing the vehicle’s fuel consumption and reducing its emissions while retaining the vehicle’s performance, safety and consumer appeal.

Cooper has a long-standing partnership with The Ohio State University (OSU) EcoCAR team, helping with the design and machining and other efforts to improve fuel economy.

Each year, university teams compete in events that range from oral presentations to on-road vehicle testing to communications and business execution. The events are judged by industry sponsors and professionals, both throughout the year and in-person at the year-end competition. The OSU EcoCAR 2 team won 1st Place Overall in the 2013-2014 EcoCAR 2 competition with Cooper providing low rolling resistance tire technology and fabrication of several parts.

Study of Renewable Domestic Rubber Source Continues

Cooper partnered with the Program of Excellence in Natural Rubber Alternatives to study the Russian dandelion as a possible domestic source of natural rubber. Cooper received a small quantity of this rubber, and preliminary lab tests indicated that this material has the potential to replace conventional natural rubber. Russian dandelions are earth friendly and represent another supply source for an important tire industry raw material.

A $3 million grant to fund this research brings together Cooper, The OSU’s Ohio Agricultural Research and Development Center, the Ohio BioProducts Innovation Center, and other university and industry partners. Research to determine whether natural rubber can be extracted from the plant and used in polymer compounds for multiple tire components will continue through 2020.