

Developing tires with less rolling resistance for better fuel economy



O A A T A C C O M P L I S H M E N T S

Advanced Modeling Tools for Tire Design and Engineering

Contacts

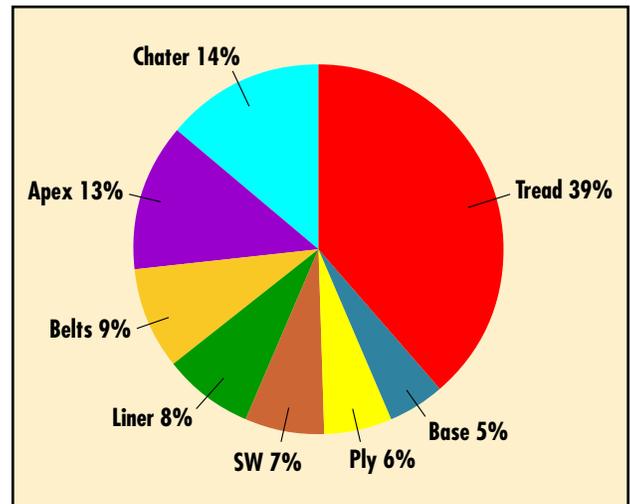
Robert A. Kost
Leader, Vehicle Systems Team
202-586-2334
Robert.Kost@hq.doe.gov

Hal Morgan
Sandia National Laboratories
505-844-7045
505-844-9297 fax
hsmorgan@sandia.gov

Tom Ebbott
Goodyear Tire and Rubber Company
330-796-4076
330-796-3947 fax
tom_ebbott@goodyear.com

Challenge

About 4-7% of a car's fuel consumption is spent overcoming the tires' rolling resistance (the energy lost from the tires making contact with the road). Developing high-efficiency tires that minimize rolling resistance while maintaining traction, handling, and durability would contribute to the higher fuel economy goals promoted by the Partnership for a New Generation of Vehicles (PNGV).



Energy loss by tire region.

Technology Description

Advanced computational tools, like finite element analysis (FEA), were applied in designing tires to isolate regions where energy losses are greatest due to rolling resistance. The results of these analyses will be useful in developing new tire designs with features such as special tread patterns, lighter yet stronger materials, reduced sidewalls (to minimize flexing), and higher pressure.

Accomplishments

The computational tools have been calibrated against actual tire performance and incorporate a broader range of physical effects than previously evaluated, resulting in increased modeling accuracy. This higher level of accuracy helps streamline tire model development, enabling faster design solutions and production.

Benefits

Tire manufacturers are able to target specific tire regions that can be redesigned to lower rolling resistance.

Designs can simultaneously lower rolling resistance to improve fuel economy, while maintaining key tire performance characteristics.

Tire manufacturers can use the results of the computational tools to reduce or eliminate the expense of building and testing multiple prototype tires.

Commercialization

Goodyear incorporated the codes from the computational modeling tools into its production line processes.

Future Activities

Analyzing tire rolling resistance is part of a larger suite of analyses for evaluating tire wear and resistance that have been performed under a Cooperative Research and Development Agreement (CRADA) between Sandia National Laboratories and Goodyear Tire and Rubber Company since 1993. This program will continue with the ultimate objective of making advanced computational modeling tools a routine part of the tire manufacturing.

Partners in Success

- Goodyear Tire and Rubber Company
- Sandia National Laboratories

