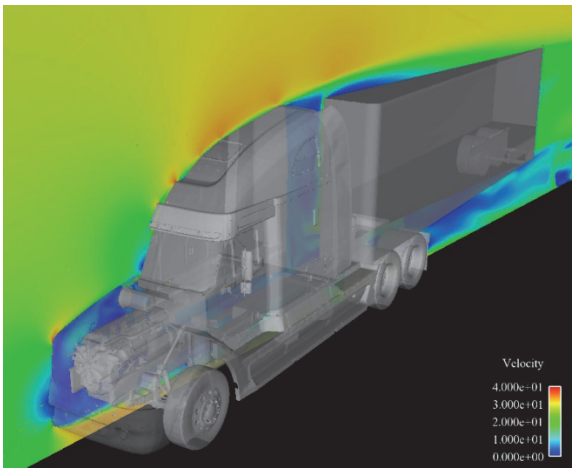
Fuel Savings for Heavy Trucks

Making Impossible Efficiencies Possible

The basic configuration of the Class 8 tractor-trailer has not changed in decades. Statistics from 2006 show that, on average, each of the 2.2 million semi-trucks on US highways consume 12,800 gallons of fuel annually—roughly 12% of America's total petroleum usage. A significant reduction in aerodynamic drag on a big rig would translate into reductions in fuel costs and greenhouse gas emissions.

Lawrence Livermore National Laboratory conducted aerodynamic research on heavy vehicles using its capabilities in high-performance computing (HPC) modeling and simulation. In partnership with industry, this Department of Energy-sponsored initiative coupled HPC with physical experimental validation to accelerate the design, prototyping, and deployment of energy-saving technology to transform tractor-trailer design. This effort identified aerodynamic improvements that boost semi-truck fuel efficiency by up to 17%.



The Laboratory teamed with other government agencies and private industry to find solutions to aerodynamic drag for big-rig tractor-trailers. (a) High-performance computing predictions were validated by wind tunnel testing, which took place in the world's largest wind tunnel at the National Full-Scale Aerodynamics Complex at NASA Ames Research Center.

This effort also sought to expand collaborations with industry in designing the next generation of highly aerodynamic heavy vehicles. To this end, the Laboratory partnered with several key members of the industry, including:

- Navistar Corporation, Inc. (formerly International Harvester)—tractor manufacturer
- Kentucky Trailer—trailer manufacturer
- Frito Lay—large fleet operator
- Freight Wing, Inc.—developer and manufacturer of aerodynamic devices
- Michelin—manufacturer of low-rolling-resistance super single tires

This effort designed and tested several concepts and devices for Class 8 heavy vehicles that boost fuel economy by as much as 17%. This translates into 6.2 billion gallons of diesel fuel saved per year, equivalent to roughly 63 million tons of CO_2 not released into the atmosphere.

Lawrence Livermore National Laboratory

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