Center for Transportation Analysis

Truck Technology Efficiency Assessment (TTEA) Project

The Truck Technology Efficiency Assessment (TTEA) Project is sponsored by the National Highway Transportation Safety Administration (NHTSA) Office of International Policy, Fuel Economy and Consumer Programs. The research is based on a vehicle energy analysis to explore measured, real-world drive cycle data in order to quantify the fuel savings and emissions reduction potential of technologies that impact the energy use of class 8 tractor-trailers. This study supports the U.S. Department of Transportation (DOT) in its mission to address energy efficiency and conservation, energy security, global climate change in transportation, and related environmental impacts.

Drive Cycle Data Analysis to Evaluate Fuel and Emissions Benefits

Drive cycle data (velocity, acceleration and elevation histories) that are fully representative of the normal usage for a trucking application is critical for accurately determining the fuel savings and emissions reductions that can be achieved when implementing new technologies. In an earlier project, the Oak Ridge National Laboratory (ORNL) collected over 23,000 hours of drive cycle data from six combination vehicles in a class 8 fleet operating primarily in the Eastern United States. The ORNL research team is analyzing this data to develop a set of short-duration drive cycles that completely characterize all of the measured drive cycles from these vehicles. This "drive cycle compression" is an important aspect of the project, allowing the overall usage of the vehicles on a long-term basis to be

represented by drive cycles of a length appropriate for detailed vehicle performance modeling. The research team has developed tools to enable the data synthesis of the vast quantities of measured drive cycles and has validated that the reduced drive cycles provide accurate predictions of the vehicle fuel economy and emissions. The synthetic drive cycles are created in a manner that the distributions of speed, tractive power and accelerations closely match those corresponding to the measured data. Inclusion of the tractive power in the evaluation is rather unique, and this ensures that changes in elevation while driving are accounted for in the fuel economy and emissions evaluations. The research team will use the compressed drive cycles to perform fuel economy and emissions modeling to estimate the fuel savings that can be achieved by employing various advanced efficiency technologies, both individually and in combination. Since the drive cycles developed for the analysis accurately characterize the usage (including the impact of road grade) of this class 8

Research Areas

Freight Flows

Passenger Flows

Supply Chain Efficiency

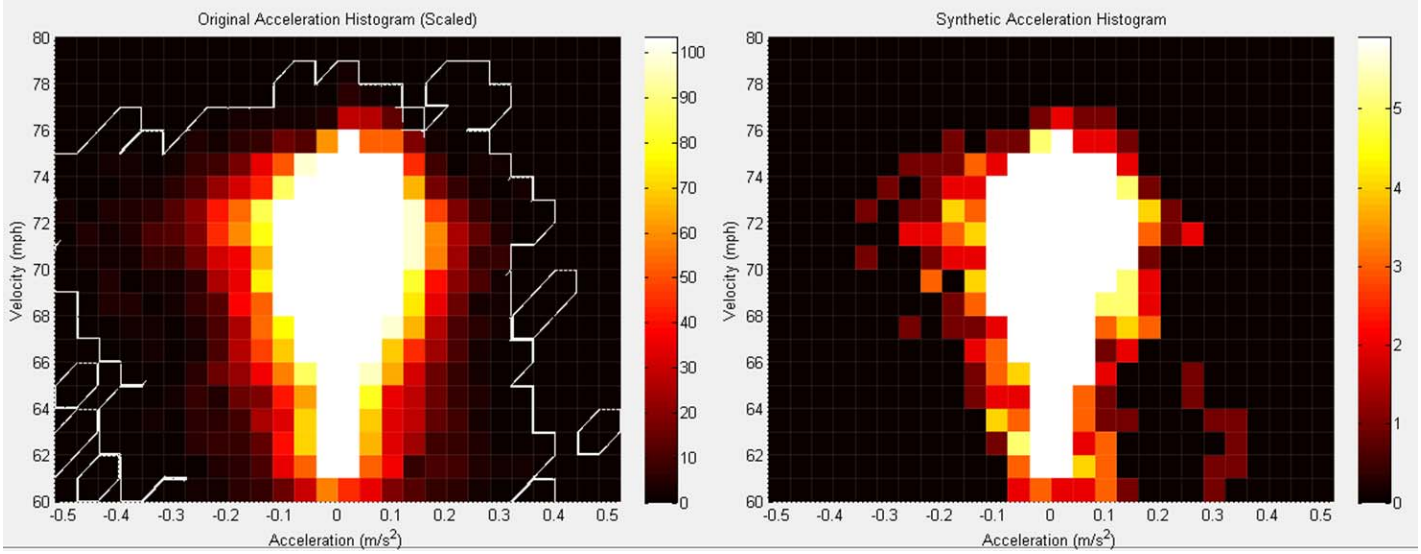
Transportation: Energy Environment

Safety Security

Vehicle Technologies

Oak Ridge National Laboratory
managed by
UT-Battelle, LLC
for the
U.S. Department of Energy
under Contract number
DE-AC05-00OR22725

Center for Transportation Analysis



A comparison of the bivariate histograms, showing the joint distribution of acceleration and velocity, for an original vs. a synthetic drive cycle

long-haul trucking application, the predicted fuel savings and emissions estimates are expected to be more representative than what would be predicted using generic drive cycles obtained from short-term measurements of a single truck. The results of this research will assist in selecting appropriate investments and policies for the trucking industry and can be used to develop a roadmap for technology deployment to most effectively reduce fuel consumption and emissions generated by heavy duty trucks.

For more information please contact:
Tim LaClair
(865) 946-1305
laclairtj@ornl.gov

Center for Transportation Analysis
2360 Cherahala Boulevard
Knoxville, TN 37932
865-946-1311
Website: cta.ornl.gov