MTDC Safety Sensor Technology

Background

Beyond the standard duty cycle data collection system used in the Department of Energy's Medium Truck Duty Cycle program, additional sensors were installed on three test vehicles to collect several safety-related signals of interest to the Federal Motor Carrier Safety Administration. The real-time brake stroke, tire pressure, and weight information obtained from these sensors is expected to make possible a number of safety-related analyses such as determining the frequency and severity of braking events and tracking tire pressure changes over time. Because these signals are posted to the vehicle's databus, they also have the potential to be read by on-board telematics solutions for inclusion in the Wireless Roadside Inspection Safety Data Message Set.

A preliminary analysis of the safety sensors was performed to determine how well the sensors have been functioning during the time period and to explore the types of information available from this expanded data set.

Electronic Brake Stroke Monitoring System

- MGM e-Stroke

A brake stroke sensor was installed at each wheel-end of the tractor with an in-cab unit to provide driver alerts. In addition, a brake system pressure transducer provides information about braking events in the duty-cycle data. A distribution of the brake system pressure is shown in Chart 1. Chart 2 displays selected braking events related brake pressure and vehicle speed.

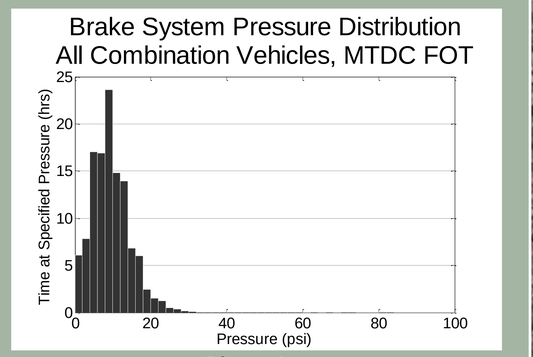

Chart 1

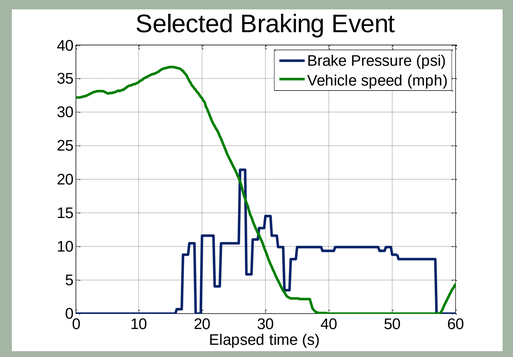

Chart 2

Tire Pressure Monitoring System

- Tire-Safeguard Display and Pressure Transducers

At each tractor tire, a tire pressure monitoring system was installed for a pressure/temperature sensor. In addition, an in-cab display provided the driver with the temperature and pressure for each tire and an alert for out-of-range values indicating a problem (such as a flat tire). The distribution in Chart 3 indicates in-range values for the sensors the majority of the time, yet with the setting of several flags.

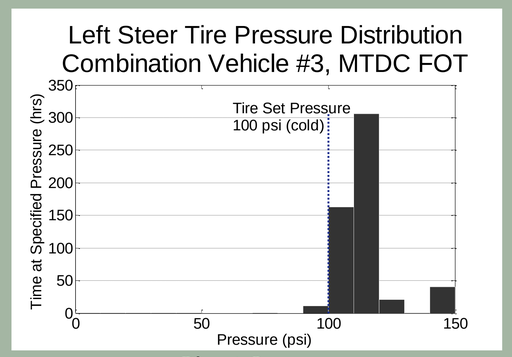

Chart 3

Vehicle Self-Weighing System

- Air Weigh LoadMaxx and Display

The self-weighing system reported drive and steer axle group weights based on sensors in the vehicle's air suspension system. Although readings were taken continuously, the system was not designed for accuracy while the vehicle was moving. As show in Chart 4 and Chart 5, the reported weights are in the range expected for these axle groups.

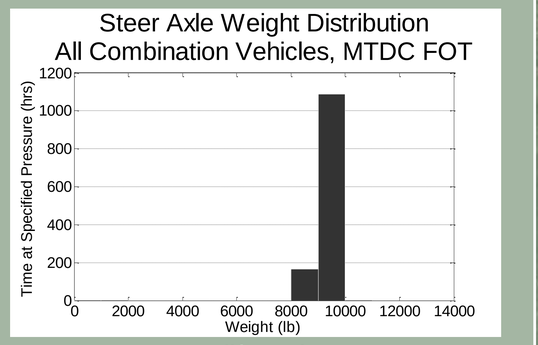

Chart 4

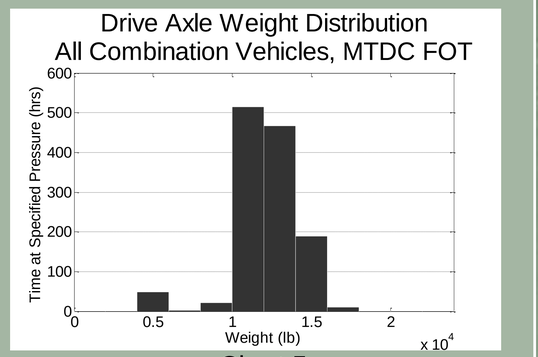

Chart 5

Commercial Motor Vehicle Roadside Technology Corridor

FMCSA

TENNESSEE DEPARTMENT OF SAFETY

TDOT

STATE TROOPER

OAK RIDGE National Laboratory