Reducing Fuel Consumption through Semi-Automated Platooning with Class 8 Tractor Trailer Combinations

Project Objective

The objective of this project is to evaluate the fuel-saving potential of semi-automated truck platooning. Platooning involves reducing aerodynamic drag by having vehicles operate in a line, mimicking the behavior between bees through the use of identical coupling, which allows multiple vehicles to accelerate or decelerate at the same rate.

Demonstration System Specifications

Vehicle Specifications

- Cab-over design
- Dual-trailer trailer
- 80,000 lb GVWR

Enabling Technologies for Semi-Automated Platooning

- Dedicated short-range communications
- Autonomous truck control
- Vehicle-to-vehicle communications
- Platooning control

Test Vehicles

- Lead vehicle (control tractor)
- Trailing vehicle

Enabling Technologies for Test Vehicles

- Dedicated short-range communication
- Autonomous truck control
- Vehicle-to-vehicle communications
- Platooning control

Track Testing Plan

- Test procedure requires a minimum of 100 miles of data collection
- Data collected includes:
  - Fuel consumption
  - Brake activity
  - Vehicle speed
  - Cooling system status

Test Truck Specifications

- Lead Truck: Class 8, 53' van, 60,000 lb GVWR
- Trailing Truck: Class 8, 53' van, 60,000 lb GVWR

SAE J1321 Type II Fuel Consumption Test Method

- Test procedure requires a minimum of 100 miles of data collection
- Data collected includes:
  - Fuel consumption
  - Brake activity
  - Vehicle speed
  - Cooling system status

Fuel Savings Results

- Team fuel savings ranged from 3.1% to 6.5%
- Trailing truck saw savings from 2.8% to 9.7%
- Fuel savings increased as following distance decreased

Fuel Consumption Results: Individual Fuel Savings

- 0.2% to 0.5% savings @ 65 mph, 65k, 30'
- Higher 2015 regularly reported fuel savings
- grill following distance cannot be known for the testing condition

Key Findings

- Platooning improved fuel economy at all speeds and conditions
- Heavy payloads affect the percent savings from platooning, but still result in a reduction in fuel consumption

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