Florida Department of Transportation Research

Florida ATMA Pilot Demonstration and Evaluation

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Current Situation

Florida roadways are maintained with a minimum of interference with traffic. Often, only a single lane is restricted for this work. This places Florida workers at risk from drivers that ignore the warning signs, diversion arrows, or cones that mark the work zone. To mitigate these incidents, a truck with an attenuator is placed at the rear of the work zone. This truck-mounted attenuator (TMA) extends from the rear of the truck and can absorb the impact of a typical sedan traveling 55 miles per hour. Impacts of larger or faster vehicles may overwhelm the attenuator and damage the truck, and TMA drivers have been injured or killed. An automated TMA (ATMA), a driverless follower vehicle with an attenuator under the control of a leader vehicle has been developed, thus removing a driver from this potentially hazardous situation.

The ATMA leader vehicle and the driverless follower vehicle are connected by several types of communications.

Research Objectives

University of Florida researchers tested the automated truck-mounted attenuator (ATMA) in controlled, off-road settings and on active roadways in simulated work zones.

Project Activities

The researchers reviewed the available literature about the ATMA and the experiences of agencies that have tested or deployed it. They then planned a series of tests in both controlled settings and on active roadways to evaluate the performance of the ATMA.

Testing in the controlled setting began with training for operators and researchers on the ATMA, its setup, and its operation. Tests were then conducted to observe the operating performance and safety performance of the ATMA. Operating performance evaluations included maintenance of following distance, the driverless vehicle's precision in following the leader vehicle on straight and slalom courses, lane changing, minimum turn radius, simple turns, and U-turns. Safety performance evaluation included emergency stop features, obstacle detection, vehicle intrusion, object recognition, and response to bumps. In most tests, the ATMA performed as expected. In one test, the ATMA failed to detect a short obstacle, and in another, it abruptly diverted from the expected path after encountering a bump.

For open road testing, the leader vehicle towed a falling weight deflectometer, a potentially routine use for an attenuator truck, a mobile operation that requires occasional brief stops. A standard TMA drove between the leader and follower vehicles for additional safety during testing. Simulated operations were conducted on different types of roadways, including an Interstate highway, a multilane U.S. highway, two-lane state roads, and a neighborhood road with roundabouts. The work convoy experienced numerous vehicle intrusions – cars entering the space between leader and follower – resulting in the follower automatically stopping. It was observed that the ATMA was challenged by any turn with a radius of less than 65 feet.

The researchers developed a benefit-cost analysis to help decide whether adding an ATMA to a work fleet is advantageous. The researchers made a number of recommendations based on their findings.

Project Benefits

The results of this project provide guidance for using the ATMA, which has the potential to prevent worker injury and death.

For more information, please see www.fdot.gov/research/.