



Caltrans Division of Research,
Innovation and System Information

Research



Maintenance

MARCH 2021

Project Title:
Autonomous Maintenance
Technologies in Work Zones

Task Number: 3265

Start Date: August 1, 2018

Completion Date: March 31, 2021

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Evaluation Of Autonomous TMA Trucks For Use In Caltrans' Operations

Test an Autonomous Truck Mounted Attenuator's (ATMA) ability to provide the same protection as a conventional Truck Mounted Attenuator (TMA) truck.

WHAT IS THE NEED?

California Department of Transportation (Caltrans) highway maintenance and repair activities often require a shadow (trailing) truck equipped with a TMA to provide impact protection for workers from errant vehicles. The nature of shadow trucks, or TMA trucks, dictates that they will be hit by errant vehicles, so while the TMA truck increases safety for the workers, each collision still compromises the safety and well-being of the shadow truck driver.

There is a need to completely remove Caltrans' shadow truck drivers from the risks associated with errant vehicle impacts. With the advent of autonomous vehicles, it may be possible to eliminate driver exposure by utilizing ATMA trucks. Research is needed to determine if existing ATMA technology can fill this need, and if not, document what is needed to reach the goal.

WHAT ARE WE DOING?

Caltrans is working with the Advanced Highway Maintenance Construction Technology Research Center (AHMCT) at University of California, Davis to conduct this research task.

A research project panel will be developed as the first part of this research task to help guide this effort. AHMCT will then procure an ATMA truck, based on specifications that have been developed by Caltrans Division of Equipment. During the procurement process, AHMCT will perform a product search for equipment that can provide ATMA capability, as well as review current regulations on autonomous vehicle usage as they relate to the ATMA truck.



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An ATMA system test plan will be developed based on guidance from the research task panel. The system test plan will focus on the ATMA's ability to provide the same protection as that of a standard TMA truck. The ATMA evaluation will attempt to answer the following research questions:

- Where and in what situations can the ATMA truck safely maneuver without a driver?
- In what operations can the ATMA truck be safely used?
- What operations could the ATMA truck be used in if reasonable modifications were made?
- Are there any "fatal flaws" in the technology?
- Are there special maintenance issues or considerations?
- What is the worker feedback on likes/dislikes, maintenance issues, operational issues, and requests for improvements?
- Do workers accept the machine and want to use it?
- What training or certifications are required for operation?

The main deliverables for this research include an ATMA system, the final report that documents the product search for equipment, current autonomous vehicle regulations, and the evaluation of the ATMA truck.

WHAT IS OUR GOAL?

The goal of this study is to evaluate the ATMA truck's ability to provide the same protection to Caltrans workers as that of a standard TMA truck.

WHAT IS THE BENEFIT?

Caltrans will benefit from this research by being a national leader in the use of autonomous and connected vehicle technology that can potentially reduce or eliminate threats to employees while maintaining public safety.

WHAT IS THE PROGRESS TO DATE?

AHMCT conducted operational testing of the Royal/Kratos leader/follower ATMA system at a closed-track facility on the UC Davis campus. ATMA test scenarios were conducted with a safety rider in the driver's seat of the follower vehicle in autonomous driving mode for approximately 100 hours. Approximately 60% of the testing has been completed and significant progress has been made on the report documentation. Additional testing took place in October 2020 in San Diego. This testing documented some issues with the reliability of the system working properly under long bridge sections. Kratos is going to adjust the system, and additional testing will take place in Spring of 2021. A no cost time extension will be needed to complete testing and documentation of the research.

For additional information, please contact the Task Manager.

IMAGE



Figure 1: Image of ATMA in operation.