ITS Field Operational Test Summary

Wisconsin/Minnesota Automatic Out-Of-Service Verification

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Introduction

The Wisconsin/Minnesota Automatic Out-Of-Service Verification ITS Field Operational Test created, tested, and evaluated the use of an automated, real-time system providing access to data about commercial vehicles and/or drivers placed Out-Of-Service (OOS). The test aimed to increase the effectiveness of OOS enforcement and to establish and coordinate a bi-state enforcement program.

The tested system operated along a 252-mile section of westbound Interstate 90 and Interstate 94 in Wisconsin and Minnesota. The actual testing phase of the project occurred from June 1, 1995, to June 30,1996.

Project Description

The OOS verification system was established at four inspection stations on the I-90/I-94 corridor, three in Wisconsin and one in Minnesota (See Figure 1). As a commercial vehicle proceeded through one of the four inspection stations (safety and weight facilities) along the test corridor, a scanner read the license plate. The system compared the reading to licenses contained in an OOS vehicle database using specially designed software operating on a personal computer (PC) at each station. If the software found a match of the reading, the system sounded an alarm to inform inspectors. Inspectors could then take whatever action necessary to insure that the problem that had caused the driver or vehicle to be placed OOS had been corrected. State Patrol inspectors in both states had electronic access to the shared OOS database.

The test maintained the OOS vehicle database on a mainframe computer in Wisconsin. All inspection stations involved in the test were linked to the mainframe in real-time. The system updated the OOS database on the PC using a download from the mainframe. The update occurred frequently enough that a truck that was put out-of-service at a downstream station and then left the station would be identified at the next upstream station.

The evaluation of the system tested the achievement of three goals:

- Increase the effectiveness of OOS enforcement efforts
- Establish a bi-state enforcement program
- Identify potential future applications

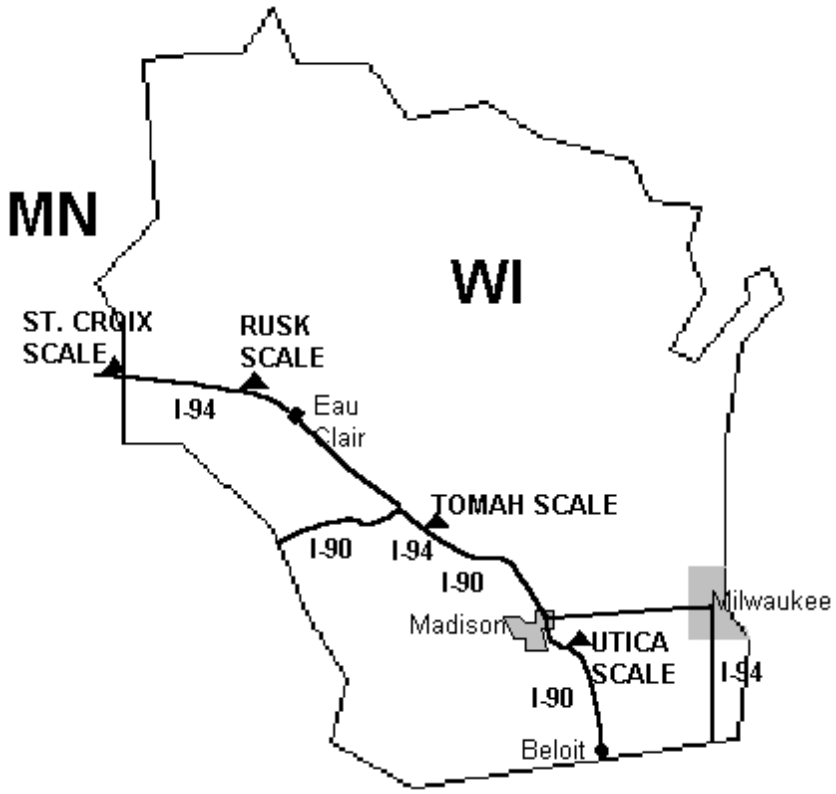

Figure 1: Location of Operational Test Inspection Stations (at scales)

Results

The test measured the effectiveness of the enforcement efforts in Wisconsin by several statistics. These statistics included the number of vehicles screened for inspection and the proportion of OOS violations found during inspections. The use of the automated scanner to read license plates produced a significant increase in the number of queries to the violation database. This increase alone served to increase the effectiveness of enforcement by checking significantly more vehicles for possible violations than had been possible using manual methods. Although possibly not the direct result of the tested OOS system, the number of inspections that found OOS violations increased by a small amount. Compared to the same quarter of the preceding year, the percentage of inspections resulting in OOS violations increased between 2.1 to 5.2 percent among the different inspection stations. In addition, the proportion of inspections finding non-OOS safety violations also increased at the three locations. The test indicated that using the system could potentially increase the proportion of OOS violations found during the regular inspection process.

Prior to the test, available data on OOS violations showed that encountering a driver and vehicle at an inspection station that was "operating OOS" was a rare event. In fact for all inspection sites statewide during the operational test, of 31,401 inspections conducted only 37 found a driver or vehicle operating OOS. The test personnel felt that the increased scrutiny of trucks and the higher likelihood that inspectors would discover OOS vehicles caused more drivers to use by-pass routes to avoid the inspection stations. Therefore, during the test and despite the increased enforcement

effectiveness, "operating OOS" continued to be a rare event. Test personnel concluded that the tested system did not have an impact on identifying drivers operating OOS.

The project successfully established a bi-state enforcement program. In addition to the three installations at scales in Wisconsin, test personnel installed the system at the St. Croix scale in Minnesota. The test established and maintained a real-time link to Wisconsin's mainframe computer. Minnesota inspectors regularly accessed the database using the same real-time link as their Wisconsin counterparts. The test results suggest, however, that a data quality (costly), real-time link to the Wisconsin mainframe database was not essential for the effective use of the system at the St. Croix scale. A connection to the mainframe using a modem and a standard telephone line would have been similarly effective at a much lower cost.

In terms of number of potential OOS violations, the operation of the system at St. Croix produced approximately the same level of identifications as was found at the Wisconsin stations. This result shows that the data sharing across the state boundary creates similar opportunities as within Wisconsin.

The largest potential benefit from the OOS database system is likely to be the benefit from integration with the SAFER system. (SAFER is a national database maintained by the USDOT that provides carrier and vehicle safety information electronically at the roadside.) Currently about 95% of the license plates read by the tested system provide no information about the vehicle or the driver (the vehicle is not OOS). By creating a link to the SAFER system, many of these license plates could be used to access safety information. Inspectors could then select for inspection vehicles that have a higher probability of being OOS or of having other safety violations.

The test personnel made considerable effort to evaluate the accuracy of the license plate scanners. The level of accurate readings as a percentage of all vehicles was only 36 to 43%. This level was substantially less than expected for several reasons. In some cases, trucks followed each other too closely ("tailgating") for the scanner to observe the license plate. The scanner sometimes mistakenly triggered on a component of the trailer, rather than the rear of the trailer, particularly for slow moving vehicles. Some license plates (between 24 and 30 percent) were so damaged of dirty that the scanner could not read them. Finally, some state's license plates were more difficult to read (notably Minnesota's) because of the background color or design or the use of non-alphanumeric characters.

Test personnel recommended that additional research in several areas:

- Integrating the tested system with the SAFER system;
- Determining the benefits of collecting planning related data;
- Evaluating the potential for expansion of the system to other regulatory issues and to other inspection stations; and
- Developing an effective methodology for using the system in mobile vehicle enforcement.

Legacy

Two of the three installation sites in Wisconsin experienced such poor license plate recognition success rates that they stopped using the system when the test concluded. The third site had

success and continued to use the system until it stopped functioning due to a need for repairs. Wisconsin DOT will not repair it and the system has been shut down.

Test Partners

Federal Highway Administration

Minnesota Department of Public Safety

Minnesota Department of Transportation

Preceptics, Inc.

University of Wisconsin at Madison

Wisconsin Department of Transportation (Project manager)

References

Smith, Jr., Robert L.; MN/WI Automatic Out-Of-Service Verification, Final Report, June 1997