RE-ASSESSMENT OF DRIVING SIMULATORS FOR THE TRAINING, TESTING AND LICENSING OF COMMERCIAL VEHICLE DRIVERS

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Summary: Simulators have been successfully employed within the military sector and commercial airline industry for over 30 years. Simulation technology may supplement the training, testing, and licensing of commercial motor vehicle (CMV) drivers if its value can be sufficiently demonstrated. The Federal Motor Carrier Safety Administration is planning to conduct a simulation validation ("Sim Val") study in fiscal year 2002 (FY 2002) to do just that. In April 1996, FMCSA (the-then Federal Highway Administration) published a research report which discussed the availability and performance of truck driving simulators available at that time. The research indicated that the truck simulators were sufficiently mature to conduct a validation study. Thus the FMCSA developed and publish Sim Val Research Design (May 1999). Given breakthroughs in technology in recent years and to gain a better understand of the functionalities of the truck simulator currently available, FMCSA is conducting a truck simulator reassessment. To help accomplish this work, FMCSA engaged Veridian Engineering.

This paper describes the interim results of the reassessment of truck simulators to ascertain their performance and functionalities in support of the FMCSA SimVal Program. **NOTE**: This paper contains interim assessments of the simulators discussed. The interim assessments, made by Veridian Engineering and the Expert Team, were reviewed and approved by the respective vendors. Final assessments will be contained in the FMCSA final report.

PROGRAM OVERVIEW

In April 1996, the FMCSA (the-then Federal Highway Administration) published the initial report describing the performance of truck simulator technology available at that time. Based on this research, it was concluded that truck driver training simulator s were sufficiently mature for validation purposes. Since that time, technology improvements have been significant. In particular, computing power and image generation have increased the capabilities of truck simulators. Veridian Engineering was tasked with performing a re-assessment of commercially available truck-driving simulators to support the FMCSA Simulator Validation ("SimVal") Program. Veridian Engineering personnel reviewed literature on commercially available truck simulators. Candidate simulators include, but are not limited to, the Doron VMT-301, the Digitran SafeDrive 1000, FAAC Driver Training System, and the I*SIM TruckSim.

Veridian Engineering developed an evaluation tool in concert with FMCSA. The evaluation tool responded to the requirements of the FHWA Report *entitled "Research Design: Validation of Simulation Technology in the Training, Testing, and Licensing of Tractor-Trailer Drivers"* (FHWA publication no. FHWA-MC-99-060, May 1999.) This report details the research design to FMCSA will employ to validate the use of simulation technology for the training, testing, and licensing of CMV drivers. The research design consist of three parts, as follows: Part 1 addresses the forward transfer of training (conventional tractor-trailer vs. simulator-based training) for entry-level drivers; Part 2 assesses the advanced capabilities (emergency maneuvers, front tire blow out, etc.) of the test simulator; and Part 3 assesses the participants' post training driving record following their successful completion of the Commercial Drivers License.

The research design report contains the driving scenarios FMCSA intends employ as part of the validation study. An evaluation tool was developed to reflect the driving scenarios described in the Research Design report. Similar to the initial study, simulators features and functionalities are described as either "Adequate", "Not Adequate", or "Not Available" in the evaluation tool. A comments section for each simulator feature/scenario is also provided.

The simulators were evaluated at the manufacturer's facility, or at a customer facility designated by the manufacturer. An expert team of five individuals with expertise in truck driver training, human factors, truck driving, simulation, and experimental design was selected to evaluate the simulators. The expert team conducted a thorough "test drive" of each simulator. The "test drive" included an evaluation of the simulator to perform close quarter maneuvers, ability to replicate driving on highway and city roads, as well as mountainous terrain and hazardous driving situations such as blow-outs. System driver training tools were also evaluated. The simulator's capability to duplicate hazardous driving situations such as blow-outs and emergency steering maneuvers was also evaluated. The Team's visit to each site generally was performed in one day. The team spent on average seven to eight hours reviewing the capabilities of the system.

The reassessment of these simulators by the expert team will be used by the FMCSA to support the SimVal study. In these visits the team sampled the capabilities of the simulator with respect to the evaluation tool previously developed by the team by "driving" each simulator. The "test drive" included, but was not limited to, an evaluation of the simulator's ability to perform close quarter maneuvers, ability to replicate driving on highway and city roads, as well as mountainous terrain

SIMULATOR FUNCTIONALIES

Table 1 contains an overview of the functionality of a number of truck simulators evaluated by the expert team during the course of this program. The information shown was provided by the manufacturers and/or the functionality of the system was observed by the expert team during the evaluation. Vendors approved all information applicable to their system. A simulator reassessment report will be published and widely disseminated by FMCSA.

CONCLUSION

The Sim Val study, scheduled to commence in FY'02, will prove an empirical basis for examining how simulator technology, as compared to conventional methods, may facilitate and enhance tractor-trailer driver performance.