

Mobile Driver Training Simulators



In order to enhance its statewide bus driver training program, the New York State Department of Transportation (NYSDOT) acquired bus simulator technology in January of 2007. Their new state-of-the-art driver simulator is being utilized to assist rural operators in training their drivers. Bus simulator training involves the use of a simulated bus driving compartment, which provides behind the wheel, hands-on training in a virtual environment. This technology has been effective in improving safety and can be a cost-effective addition to driver training programs for smaller operators when taking a regional approach.

Why Invest in Simulator Training?

Safety for passengers, drivers, and the general public must always be the number one priority for transit operators. In order to operate safely, investments in driver training are essential. However, with limited resources, there is a need for cost-effective driver training programs for small urban and rural transit operators. One possible solution to consider is a regionally based Mobile Bus Simulator Driver Training program.

How Does a Driver Simulator Work?

A driver simulator works by letting drivers experience real life situations and allowing them to practice safe driving techniques to avoid accidents in the kinds of vehicles they normally drive. Drivers are able to go through driving scenarios that test their abilities.

Using a Driver Simulator Helps:

- Drivers experience and prepare for the unexpected in a simulated and controlled environment
- Routinely exercise skills to enforce safe practices
- Improve driver confidence and boost moral
- Lower Insurance Costs
- Reduce Insurance Claims
- Save time and money by sharing a mobile unit



Interior of Driver Simulator purchased by the State of New York

TCRP Report 72

"Simulators and Bus Safety: Guidelines for Acquiring and Using Transit Bus Operator Driving Simulators"

The Transit Cooperative Research Program published a report on the effects of simulators in 2001 that concluded that bus simulator training can be a very effective addition to a driver training program and that significant safety benefits were reported by transit operators using the bus simulator.

DVD training videos NYSDOT has acquired for use in the simulator:

- Adverse Weather Driving
- Crash Avoidance III
- Detecting Critical Information
- Evasive Action Skills
- Good Driving Strategies
- Handling Weather Conditions
- High Risk Situations
- Intersections
- Limited Access Highways
- Rural Roadways
- Safe Driving Techniques
- Searching for Safety
- Stopping in Time
- Threat Recognition I
- Threat Recognition II
- Transit Bus: Driving Awareness
- Vans: Reducing the Risk

“The technology allows for cost-effective, safe training of bus operators. Transit systems that have hosted the simulator have reported positive feedback from drivers and demand for the mobile training unit remains high. More than 500 drivers have participated in simulation training around New York State.”

–Bill Telovsky, NYSDOT

Best Practice – Simulator Training for Rural Transit Operators – A Regional Approach in New York

Prior to 2007, the only operators in New York with bus simulators were the Metropolitan Transit Authority (MTA), New York City Transit and the Rochester-Genesee Regional Transportation Authority (RGRTA); largely due to the fact simulators are expensive. Typically only larger agencies have sufficient financial resources and the number of drivers to justify the cost. Recognizing bus simulators were being used only by larger transit operators and there was a need for this type of training among rural operators, New York decided to take a regional approach to driver simulator training to benefit smaller operators.

While it may not be cost-effective for a small, individual operator to acquire a bus simulator, economies of scale may be realized when sharing a simulator across a large region or state. This allows for maximum participation by many rural transportation providers. It would also provide a training site relatively close to the operators, which is an important consideration. Many small operators cannot allow their drivers to travel long distances for training because of limited staff and budgets; therefore, this regional approach is an attractive option that is supported by TCRP Report 72.

NYSDOT, along with the NY RTAP Advisory Committee, began investigating bus simulator training in the fall of 2002. The investigation included hands-on demonstrations of two different manufacturers’ simulators, as well as actual driver training sessions on one of the simulators. Based on these efforts, NYSDOT and the NY RTAP Advisory Committee decided to implement a simulator training program for small urban and rural transportation operators around the state.

In the spring of 2004, NYSDOT surveyed all Section 5310 and 5311 grantees in the state to assess the level of interest in bus simulator training. Seventy-six agencies responded and indicated a strong interest in simulator training—only two operators were not interested. The interested agencies collectively have more than 3,600 drivers, which forms a large potential pool of training candidates.

The NYSDOT provided 100 percent state funding to Broome County Transit (BC Transit) in Binghamton to acquire a multi-station simulator (two buses and six cutaways) mounted inside a trailer. The simulator is primarily housed at BC Transit during the winter, but moves to various host locations around the state for use in local and regional training classes. The “Train-the-Trainer” approach is utilized to train instructors from properties that will be hosting the simulator.

Simulator Types and Manufacturers

Four basic types of simulators can be identified: open-loop video, low-end simulator, mid-range simulator, and high-end simulator. Open-loop video devices are the most popular training tools used by transit agencies (TCRP Report 72, p. 8). They consist of several student stations, each with a steering wheel, gas and brake pedals, and basic dashboard. Students watch a video display of traffic, however, the stations are not interactive—the video could show a left turn, while the student turns the wheel to the right. This system has training value in the areas of perceptive skills and reaction time, although it does not simulate the external driving environment.

Low-end simulators can be PC-based, or can consist of a scale model bus on a model board whose movements are controlled by the student. This represents early simulator technology. Mid-range and high-end simulators use more sophisticated bus cab environments, larger field of vision (including rear view), and more powerful software. Mid-range simulators are used in New York City and Rochester. These are interactive; the student must actually “drive” the bus. Different weather and road conditions also can be simulated. High-end simulators are very sophisticated, extremely expensive and are used mainly for research and development in both ground vehicle and aviation applications (TCRP Report 72, p. 8).

For New York’s RTAP program, the open-loop trainer has been identified as desirable by the RTAP Advisory Committee and the operators who have used it. The multi-station setup allows several drivers to be trained at one time, which is an important consideration. Also, the basic perceptual skills and reaction time measurements that the trainer provides, known as skill-based training, are sought by many small transit operators. The open-loop trainer is considered to be more resource-efficient for rural operators due to its lower cost and that multiple seats allows for more than one driver to be trained at one time. Also, having it in a mobile set up also allows all transit properties to have it at their location and not tie up the limited space many rural transit operators work out of or require travel. While the mid-range simulator provides a more real-world training environment, only one driver can be trained at a time. However, a mid-range simulator also can be very effective, and could be used in a future phase of training for drivers who have already completed open-loop training. The mid-range simulator provides training in forward planning, observational skills, and use of mirrors, known as knowledge-based learning. This would complement and supplement open-loop training.

TCRP Report 72 identified two simulator vendors that serve the public transit market: First Ann Arbor Corporation (FAAC) and Doron Precision Systems. Both manufacture mid-range simulators, but only Doron manufactures an open-loop trainer. FAAC simulators are used by New York City Transit and RGRTA, while Doron simulators are used by New Jersey Transit and Cleveland Regional Transit. Each vendor has other transit customers in addition to these sites.

Simulators and Safety

Significant safety benefits have been reported by a transit agency using a bus simulator (TCRP Report 72, p. G-3). In a sample of new drivers, 75 percent were trained by conventional training and the remaining 25 percent were trained using the simulator. In the 90 days following the training, the accident rate for the drivers trained on the simulator was 18 percent; the accident rate for the drivers trained conventionally was almost 32 percent. Even more significantly, the tasks specifically trained on the simulator—left side and right side vehicle passing, and collisions with fixed objects—resulted in 17 accidents for drivers trained on the simulator, and 137 accidents for the conventionally trained drivers (TCRP Report 72, p. G-3-4; “MTA NYC Transit’s Bus Simulator: Design, Delivery, and Results” handout).

RGRTA also has identified considerable reductions in accident rates for drivers trained on their simulator. The preventable accident rate for drivers not trained on the simulator was 39 percent (91 of 234 drivers), while the rate for simulator-trained drivers was five percent (4 of 81 drivers) (RGRTA, October 2003). It is cautioned that these are very preliminary numbers; however, these early results are impressive.

What Other Rural Locations Are Using Driver Simulator Technology?

Paducah Area Transit System, Kentucky

Paducah Area Transit System (PATS) Driver Simulator Training also is utilizing a regional approach and is scheduled to travel throughout the state of Kentucky and surrounding areas with each system having the opportunity to train their drivers. The project is funded in part through RTAP, the Kentucky Office of Transportation Delivery and PATS. Additional costs are covered under other defensive driver training grants. Many insurance companies also cover the cost of PATS Simulator Training for their insured drivers. In their first full year of simulator training, PATS drivers had a 64 percent reduction in preventable accidents, and a 44 percent decrease in overall accidents (<http://www.paducahtransit.com/drivertraining.html>). "So far we've trained more than 3,000 drivers on the simulator in the first 3 years of training. We know we've prevented accidents with our training, and firmly believe we've also saved some lives!" says Lew Jetton of PATS.

Conclusion

The interest and use in driving simulation technology is spreading among the rural transit industry as positive safety and financial impacts are being realized. Mobile driver simulators, although costly, can be purchased and shared regionally among smaller operators in order to produce economies of scale and provide rural and small urban bus drivers with state-of-the-art training technology.

Resources, Acknowledgements and Contact

TCRP REPORT 72, "Simulators and Bus Safety: Guidelines for Acquiring and Using Transit Bus Operator Simulators," provides guidance to transit agency managers on whether to purchase a driver simulator and what kind is most beneficial. Also, this document provides guidance on how to use simulation effectively to improve bus operator training and safety. Information was obtained from a literature search, surveys and site visits. The guidelines are designed to be used by transit-operations management, human resource management, training instructors, operations and safety personnel.

Paul Ouderkirk was the visionary behind the simulator project in New York but unfortunately passed away a month before the simulator was delivered. The Simulator is dedicated in Paul's honor.

National RTAP would like to acknowledge Bill Telovsky, NYSDOT, for his contributions to this brief.

*This National RTAP brief is a product of the Rural Technical Resource and Communications Center. For more information, please visit the **National RTAP** website at www.nationalrtap.org, or contact R-TRAC directly at 888-589-6821.*