

Fleet Uses ‘Classroom on Wheels’ to Help Educate INDOT Mechanics

A 4-by-8-foot simulator display board inside a “classroom on wheels” is giving hands-on training a whole new meaning.



INDOT’s Fleet Division has embarked on advanced diagnostic training for the electrical system of our dump trucks. As part of the training, Fleet has unveiled a 34-foot mobile training lab that features a custom-made, two-sided simulator display board shaped like a portable coat rack. Affixed to the 4-by-8-foot board is every electrical component that is in an INDOT dump truck chassis for a complete hands-on learning experience.

Fleet conducts advanced diagnostic training outside the new mobile training lab (top photo) and inside the mobile lab, which features a two-sided simulator display board (right and bottom photos), with INDOT’s Justin Wiggs.



“The mobile lab for our dump trucks, which also double as our snow-plow trucks, includes a fully functional dump-truck interface,” said Statewide Shops Operations Analyst Justin Wiggs. “We have taken all the major electrical components that are behind the wheel or under the



hood and put them on the display board. We consider the simulator to be an actual vehicle; it has its own vehicle information number. The simulator has its own engine control module, which controls most components in an engine through a series of plug-in sensors. It has its ‘own brain,’ if you would, and all the modules that you would find on an actual vehicle.”

Wiggs continued: “It’s a truck on a board. It can think for itself, show fault codes for itself, and operate headlights and the wiper motor. It can simulate itself driving down the road.”

Training began in late August at the LaPorte District's Winamac Unit. September training was conducted in the Crawfordsville district, with other districts to follow this fall. This first round of this advanced training is designed for select INDOT shop personnel, who Fleet calls INDOT Champions.

"Technology has evolved quickly in our dump trucks in the past 10 years, particularly as related to diesel engines," said Statewide Fleet Director Jason Kruse. "As a result of this advanced technology, trucks have become more prone to electrical problems. The presence of large quantities of salt in and around our trucks significantly increases the opportunity for failures. The educational, hands-on section helps each participant walk away with deeper knowledge of diagnostic skills."

As recently as five years ago, INDOT did little to fix equipment that had advanced electrical problems. We had no OEM Tools diagnostic software, and we shipped equipment to dealers for repair. Today, our equipment mechanics more easily comprehend diagnostic basics because we've procured OEM Tools diagnostic software and they've been trained in its use. This proficiency has resulted in less downtime for repaired vehicles and significantly reduced repair costs.

Proficiency is reaching the next level, thanks to Fleet's advanced training to INDOT Champions.

"Training in recent years involved a defined preventative maintenance program, which included a comprehensive inspection to reduce failures by identifying potential problems and correcting them in advance," said Kruse. "But prevention can't stop everything. Based on this reality, we have moved to the next step in training by procuring diagnostic equipment for dump trucks. This advanced training will enable our team to get trucks repaired more efficiently and back on the road faster."

At the Winamac Unit in late August, approximately a dozen LaPorte District shop employees received two days of high-level training. Stoops Freightliner Technical Sales Representative Austin Hill, who has interacted with INDOT for nine years, led the first-day session with assistance by Wiggs and Plymouth Subdistrict Shop Foreman Adam Szyal.

First-day training took place outside the mobile training lab. Hill used a large monitor to display the computer-based diagnostic software that INDOT mechanics use to repair Freightliner and Detroit powertrain vehicle systems. Hill first reviewed the basics but transitioned to more puzzling scenarios involving engine control-unit fault codes, instrumentation problems, and more.

While speaking, Hill referred to posters stationed behind him, affixed to the exterior of the mobile training lab. The posters began appearing in shops about a year ago to help mechanics solve electrical

issues with INDOT vehicles. One of the posters showed the intricacies of the bulkhead module, which is the primary module of the vehicle electrical system and controls the operation of the



Stoops Freightliner Technical Sales Representative Austin Hill points to a large monitor (top photo) while diagnostic software loads to display information on the screen. Posters (left photo) diagram electrical system issues, and troubleshooting and repair processes.

other “multiplex” modules in the system and a variety of other vehicle components either directly or indirectly. Multiplexing is the act of modules, which are connected to one another by a communication wire, “talking” to one another electronically.



Gary Subdistrict Equipment Mechanic Gino Gordon (from left) participates in a discussion with instructor Austin Hill.

“Both days of training were very helpful to me,” said Plymouth Subdistrict Equipment Mechanic Dan Reichenbach. “All the instructors explained things well, which turned on a lot of lights for me. Having hands-on training with every electrical component of the trucks we work on right in front of us on a training board, and then using the posters and practicing what we learned, made the posters I’ve seen the past year make more sense. It was simply outstanding.”

To watch a video of a portion of first-day training, click [here](#).

Second-day training took the INDOT employees inside the state-of-the-art “classroom on wheels” for even more revelations. There, the dump-truck simulator display board housed all the electrical components, providing a hands-on visual element to the in-classroom training.

“We bugged the two-sided panel with a variety of problems so that the mechanics could troubleshoot these issues first-hand, as if they were on the job,” said Wiggs. “This live bugging of the simulated board and an actual truck gives our mechanics real scenarios and practical experience that they can carry forth.”

Each team was tasked with troubleshooting problems on the board and trucks. The problems were real-life examples that will be encountered in our shops. Each team conducted tests on the truck and then referenced the diagram posters for guidance in troubleshooting. The teams were able to successfully diagnose the problems and repair them during the session.

“They all seemed very excited to have not only learned new information but were truly proud to have corrected the problems,” said Kruse.

Wiggs spent more than a year working behind the scenes to make the two-day training a reality.

“This customized training option caters to the specific needs of INDOT and was designed with fiscal responsibility, employee development, and equipment uptime in mind,” said Wiggs. “We have partnered with other departments and vendors to create and adaptable and nimble program that INDOT will control instead of relying solely on training vendors.”

After INDOT Champions are trained, they will help teach other employees at each of their locations.

The 34-foot mobile training lab — which is housed at the Greenfield District Albany Subdistrict when not in use — was designed to accommodate different modules, and these modules will be used in 2021 and beyond.

“When we put all of this together, what we wanted to be able to use various modules for different training opportunities,” said Wiggs. “In the future, we will have modules involving dead engines, disc brakes, drum brakes, exhaust after-treatment, and electrical, the latter of which is for all vehicles, not just trucks. As a result, we will continue to host training events geared toward the current needs within a specific subdistrict, district, or INDOT-wide basis.”

Besides Stoops Freightliner, Fleet will also partner with Cummins to provide in-person and virtual training opportunities regarding equipment used for summer and winter operations. To prepare for virtual training, Fleet is working with an e-learning company that specializes in vehicles and systems technologies.

“E-learning will provide a deeper knowledge on specific systems within all classes of equipment and vehicles,” said Wiggs. “The e-learning system even offers the option of categorizing and examining the distinct needs of a specific shop.”

But e-learning and other mobile-lab modules are down the road. Right now, the dump-truck electrical-system module is front and center.

“This in-person training is the pinnacle for software operation and utilization, engine diagnostics, electrical troubleshooting, and more,” said Wiggs. “Many employees have been influential in the development of the program, including technicians, shop foremen, and fleet managers. This massive undertaking has been amazing and has created a sustainable, actionable, and relatable training program that will be used for years to come. This truly will thrust our employees to the next level.”