# Handle with Care: Training Battery Assemblers at Detroit Diesel

Pull up to Detroit Diesel Corp. (DDC), re-branded a decade ago simply as "Detroit" when its product line expanded beyond engines to include transmissions and axles, and you will understand the plant's website descriptor: "It demands to be seen."

Located in Redford, Mich., the historic Detroit Manufacturing Plant is massive in size and scope: Spanning more than 3 million sq-ft—larger than 52 football fields!—the facility pumps out 500 engines, 250 transmissions, and 1,100 axles every day.

General Motors Co. began building diesel engines here under the Detroit Diesel Engine Division in 1938. During World War II, the plant was an active member of the Arsenal of Democracy, supplying compact, two-cycle engines for tanks, landing craft, road-building equipment, and standby generators. By 1943, Detroit Diesel employed 4,300 people, including more than 1,400 women, who together built 57,892 engines in 1943.

The company, which is now a division of Daimler AG, has seen major changes in recent years without missing a beat. Earlier this year, Freightliner, also a Daimler brand, unveiled the production version of the all-electric eCascadia Class 8 truck after extensive testing of pre-production models with fleet customers. Debuting at the Advanced Clean Transportation Expo in Long Beach, Calif., the eCascadia is an electric semi-truck suited for short-haul routes that allow for depot-based charging. Ideal uses include last-mile logistics, local and regional distribution, drayage, and warehouse-to-warehouse-applications. It is powered by the Detroit ePowertrain that generates 320 hp in a single eAxle configuration and 470 hp in a tandem design, with three battery options offering a range of up to 230 miles (from the largest 440-kWh pack).

The other high-voltage (HV) battery options are a 195-kWh pack with charging times to 80 percent and 100 percent capacity of 1.5 and 3 hours, respectively, and a 291-kWh (2-4 hours) in addition to the 440 (2-6 hours). The packs feature a lithium-ion (Li-Ion) nickel-manganese-cobalt battery chemistry packed inside of CATL prismatic cells.

Battery assemblies are not compact. There can be 18 modules stacked in three layers of six each with each module containing 18 cells (108 in total). According to a company press release, Detroit's Li-Ion batteries enable the eCascadia to meet its range targets without sacrificing payload, which peaks at 82,000 lbs (37,195 kg) max gross combination weight.

## How to Qualify Battery Assemblers

Demand for the new etruck is off to a strong start. Soon after the announcement of series production in May, Sysco Corp. signed a letter of intent to purchase 800 eCascadias and deploy them in its fleet through 2026. With Detroit charging into battery manufacturing, *Manufacturing Engineering* recently visited the landmark plant and spoke with Keith Vaughn, manager of technical services, and Jon Gould, chief electrical specialist and powertrain safety engineer, about their efforts to train and qualify battery assemblers.

***Manufacturing Engineering (ME):*** What's driving the effort to train assemblers?

**Keith Vaughn**: It starts with OSHA (U.S. Occupational Safety and Health Administration). You need to be qualified to work around live devices. It was around March 2021 that we began designing benchmark questions and other internal assessments to screen for qualified candidates.

**Jon Gould**: This effort is to get to the point that assemblers are "qualified" to work on batteries. But there is no direct guidance that says what is specifically needed from OSHA or NFPA (National Fire Protection Association) for battery assembly. By using best practices and requirements from OSHA and NFPA70E, we wanted to develop our program to define and achieve qualified status.

The end goal is for our workers is to understand all the hazards associated with lithium-ion batteries and when/where to identify and mitigate those hazards, for example by selecting and wearing the proper PPE. They also need to know and understand the tools required to safely assemble and measure batteries. This includes insulated tools and multimeters. Team members have to demonstrate they know and are capable of using these tools to assemble the battery

and determine the nominal voltage of a battery module and fully assembled battery. They must know when and where arc flash, limited, and restricted approach boundaries are applied, as well as where exposed energized conductors are.

***ME***: Can you describe your program structure and highlights? Is there an ideal candidate profile?

**Vaughn**: It begins with an info session covering basic topics around the product, process, safety, and operational philosophy. This session goes through what DDC will build and how. We explain the training required to work in the area. We also highlight the expectations of what a worker in the area is supposed to do. Lastly, we break down next steps to apply and get into the area.

**Gould**: After the info session, we send all those who attended to our training center to take an ePT assessment. This assessment covers basic math and intuition questions. We are looking for employees who show an ability to learn and care for their quality of work. Employees can officially post for the position after completion of the assessment. Employees will then go through an interview process with the production supervisor before they are placed in our HV3b course. One must pass the exam at the end of the course to make it on to the team. However, we still have not "qualified" the employee yet to start assembling batteries. Now they will go through battery-handling training. The very last training required before we qualify our workers is "Live Line" training. This teaches them how to properly select PPE, among other things.

**Vaughn**: We are looking for employees who take pride in their work and who are going to look out for their colleagues to make sure they are being safe and following the rules. These employees need to work well within a team. We are looking for employees who want to be a part of the future of global powertrain. With expectations high, we can continue to show Daimler and the world that Detroit is up for the challenge.

***ME***: How long is the program, and how is successful completion measured?

**Gould**: Going from the introductory info session to "qualified" battery assembler can take up to two months. The training classes cover approximately a week of this timeline. We are able to provide enough "qualified" candidates for the battery assembly process, given the appropriate percentage of employees make it through the selection process.

***ME***: What did Tooling U-SME contribute? Are there alternative training sources you considered or used?

**Vaughn**: Tooling U helped develop the HV3b and LLW

course material and delivered the first training classes for both. They took our requirements and presented the material in a way that someone without a technical background could grasp and understand.

**Gould**: We did look at online/computer training for this portion but believe that in-person instruction is the best way for Detroit Diesel. This helps ensure that the material is connecting with our employees. It is critical that an instructor can view the room and focus on topics that may need extra explanation, which our instructor certainly delivers.

In short, the demands for our employees to become more technical is increasing with the addition of alternative powertrain products. This will drive the need to develop additional courses. We think our team leaders are very good and very engaged.

**Vaughn**: Based on the initial test results, we think we hit a home run.