A System-Level Approach Ensures Repeatability in a High-Voltage World

BLOG
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Did you know that there's as much power running through a typical electric vehicle (EV) as there is in a 2,000-square-foot home with its air conditioning on? That's a lot of power — high voltage and high electrical currents — and it can be dangerous, even lethal, if something goes wrong.

That's why component reliability and durability are more important than ever to OEMs making EVs. Sure, the expense involved in repairing or replacing a faulty battery pack postproduction is significant, but the even bigger concern for OEMs and the people assembling and operating their EVs is safety. And you can't ensure safety without vehicles and components that are built to their exact design specifications, every time.

Repeatable perfection

The key to ensuring EV reliability and durability is, of course, repeatability: assembling the same component to the exact same specs, time after time after time. And the key to repeatability is automation. Studies show that, compared to traditional vehicle manufacturing processes, automated assembly improves first-time quality by as much as 50%.

Even better, automated assembly helps eliminate human error, and that's why OEMs looking to build more reliability and dependability into their EVs turn to robotics to assemble the connectors, wires, and busbars in their vehicles' electrification systems. But to make that happen requires EV parts that can be assembled by robots instead of human hands.

Start with the big picture

We build Aptiv e-mobility connectors with automation in mind, meaning machines can identify them, pick them up and install them. To enable this, we design our e-mobility components with fewer smooth and rounded features and more flattened, squared-off features that robotic arms can easily clamp onto and maneuver.

Our busbar assemblies are a good example. Not only do we build them to safely conduct greater power, but they also feature a flatter construction and rigidity that are more conducive to robotic and snap-in assembly. While the rigidity is desirable for robotic handling, we recognize the need for flexibility at certain places to accommodate assembly tolerance stackups, vehicle vibration, and thermal expansion and contraction – so we selectively integrate flexible sections into the rigid busbar system, but only where the compliance is required.

This design for automation makes Aptiv's HV components unique, and they are a direct result of our system-level understanding of how all the wiring and connectors work (and are validated) together. Thoroughly understanding how an EV's system needs to work, not just how each component inside that system needs to work, is essential to creating components that are designed for automation.

Designed for automation — and one-stop sourcing

There's no getting around the quality, cost and safety benefits of automated assembly, provided you have the right components to allow that assembly to happen. Aptiv has that portfolio and while, today, the proof of our design for automation is most apparent *inside* the battery pack, you'll soon see our proven system-level perspective and electrification expertise outside the battery as well.

Further, as design for automation changes the way OEMs build their electric vehicles, it may also change the way they source the components for those vehicles. The best suppliers won't just deliver components; they'll bring systemwide expertise and accountability that help ensure OEMs make electric vehicles that are as safe for the people who drive them as they are good for the planet.

To learn more, visit aptiv.com/e-mobility.