



CHALLENGE:

While producing its latest generation of electric transportation, a leading bus manufacturer was not satisfied with the cost and complexity of its original battery coolant system. It was determined to implement new, innovative methods within a short timeframe, wishing to substitute the legacy design for lower cost, increased versatility, and higher performance.

SOLUTION:

Parker engineered a cooling distribution system that includes a thermoplastic hose and a variety of application-specific fittings. The system eliminates the need for fixturing or welding and proves to be more cost-effective and easier to install.

BENEFITS:

The electronic coolant hose reduced installation effort, improved flow, and diminished ambient energy absorption throughout the manufacturer's circuit, thus extending the life and improving the system efficiency. The new system has also cut the material and labor costs for this manufacturer by an estimated 25% or more.

ELECTRIC BUSES

PARKER'S PARFLEX ELECTRONIC COOLANT HOSE DELIVERS VALUE TO LEADING ELECTRIC BUS MANUFACTURER

A Design-Validated Coolant Distribution System and Its Effortless Installation Take Charge of the Electric Vehicle Battery Market

While producing its latest generation of electric transportation, a leading bus manufacturer noticed that its original battery coolant system was expensive and cumbersome. The system in place, at the time, revolved around aluminum tubing. The utilization of aluminum tubing left the manufacturer with long lead times, as well as high material and installation costs. Not to mention, silicone hosing was needed in certain sections to provide unit flexibility in order to prevent fatigue failures in the aluminum tubing. This resulted in an overly expensive, complex coolant system.

The bus manufacturer's engineering team was determined to implement new, innovative methods to lower cost and improve manufacturability. Upon exposure to the electronic coolant hose (ECH), they quickly realized the advantages of the product. Due to the responsiveness of the Parker development team, a whole-system solution was quickly provided to the bus manufacturer. In fact, the prototyping process for the product took three (3) months, from when Parker first heard of the manufacturer's challenge, to when the ECH was first installed on their bus.

Prior to the ideation of the ECH product, the development team at Parker's Parflex Division conducted multiple customer interviews and gained knowledge about a new fitting style. VDA connection, which emerged in Europe for coolant circuits in the automotive market, was a gap amongst Parker's product offerings. So, after examining the fast-paced market insights and realizing the bus manufacturer's likely not-so-unique problem, they launched a development for the ECH and its VDA-style fittings.

The product has served as a new economical solution for this electric bus manufacturer, as well as other companies pursuing emerging electrification innovations. Parker's ECH, like most Parker components, conveniently offers manufacturers a whole-system solution from a single source. The proven distribution technology includes a thermoplastic polyamide electronic coolant hose, as well as VDA fittings with ethylene propylene diene monomer (EPDM) O-ring seals for water-based coolants. Assembly could be performed at the manufacturing facility, or the ECH could be provided as an assembly kit. The hose material is lightweight, no installation tools are required, and the product's push-to-connect fittings minimize connection effort.

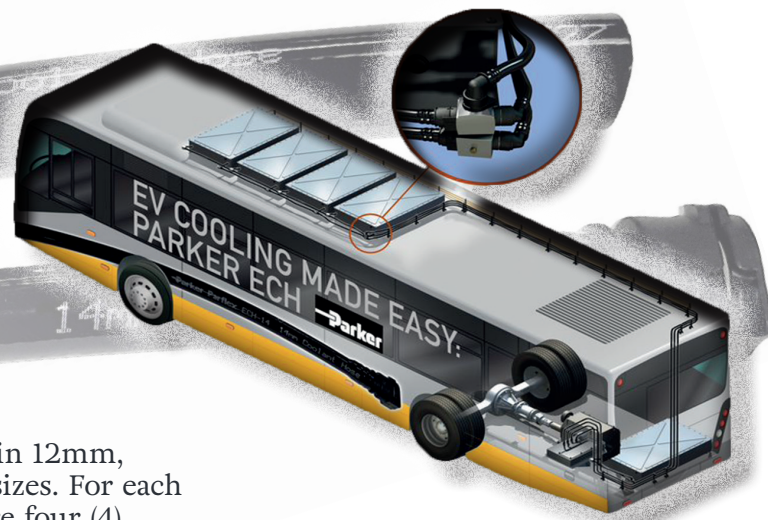
In collaboration with Parker's Tube Fittings Division and Fluid System Connectors Division, full-flow manifolds, valves, and adapters are available for a system solution. The VDA

fittings are offered in 12mm, 16mm, and 20mm sizes. For each fitting size, there are four (4) configurations: 90-degree female, 45-degree female, straight female, and straight male. The variety of fittings for the ECH allows for the cooling system to be designed with flexibility and ease.

The thermoplastic construction of the ECH is able to be thermally formed as well, which allows for increased customization of the system. Thermal forming of the hose enables the manufacturer to produce desired shapes and distribution routes for the cooling circuit throughout its application. The capability of the ECH to be formed through this method empowers ingenuity, while also maintaining precision and consistency.

By providing a diverse selection of fitting sizes and configurations, the product can be tailored to fit a wide range of applications, making it a versatile and adaptable solution.

The electronic coolant hoses are available in 14mm, 18mm, and 22mm inside diameters. These hose sizes provide sufficient flow for various e-mobility components, with minimal pressure drop. The barbed fittings are interference-fit, and



clamps are not needed.

While performance standards for e-mobility/e-work coolant systems are still developing, Parker was committed to launch a product that exceeds system requirements. Parker's design validation process included evaluation at both the bus manufacturer's in-house location, as well as within Parker's own testing facilities. The ECH product underwent an array of assessments, including, but not limited to: abrasion testing, high temperature impulse testing, heat age leakage testing, ultraviolet weathering testing, and chemical immersion. The validation plan was completed to ensure leak-free, durable performance.

The electronic coolant hose also has a significantly lower thermal conductance compared to the aluminum previously used by the manufacturer. The lower conductivity reduces environmental energy transfer to the coolant. Therefore, the ECH minimizes the need for special foam insulation.

In the end, Parker's electronic coolant hose solution has demonstrated its ability to function effectively, even on the hottest service days in challenging environments. The ECH is a reliable distribution system that is able to convey coolant at required rates, maintain cooling capacity, and increase long-term battery life.

“ Parker's ECH is a whole-system solution that is easy to install, easy to design, and saves me money.

-Project Engineer at Leading Bus Manufacturer ”