



Bowman's technology can be applied in cooling systems for electric motors, battery packs, chargers, AC-DC converters, DC-DC converters, and inverters

# Heat exchangers

Unique new technology ensures batteries are kept within their specified temperature operating range

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The marine industry, while some way behind cars in adopting electric power, is catching up fast, and over the next few years electric and hybrid-powered vessels are expected to become the 'go to' power solution for an industry reducing reliance on fossil fuels.

And this is where it gets interesting. On land, there are plenty of locations for charging points. Every street corner has a lamp post where a charger could be installed. But for marine, the situation is very different. With more limited marina space for charging points, demand could easily outstrip availability. Add the need for commercial vessels to minimize any additional downtime due to battery charging and a challenging picture emerges.

This scenario is not that far in the future either; in fact, it's an issue that is already being faced. For example, throughout Scandinavia, there are thousands of vehicle

ferries linking communities across the fjords in this part of Northern Europe. These ferries are vital communications links, as without them, vehicles would travel hundreds of extra miles each year, using fuel, creating additional emissions and adding hours to journey times. But as the ferries themselves generate CO<sub>2</sub> emissions, governments are seeking to reduce this by introducing zero-emissions vessels to ultimately replace the traditional boats. The first of these vessels are already under evaluation.

## Cooling solution

One trial currently taking place is based on a 100% electric-powered ferry. The batteries are charged after each crossing. Time is critical; upon arrival, vehicles are unloaded from the vessel and those waiting are loaded, then the vessel must be ready for departure.

To achieve this, a superfast charging system is being used. However, this type of charge

generates excessive heat, which can damage the batteries, reducing their operational life. Consequently, a system for cooling during the charging process had to be developed.

This cooling solution, which incorporates Bowman heat exchangers, keeps the batteries within their recommended temperature range, enabling them to be recharged quickly and safely. Its success could provide a blueprint for other marine applications, where superfast charging is needed.

As well as cooling the batteries, during the winter months the process can be reversed; the heat exchangers can be used to warm the batteries, as in extremely cold temperatures, the charging cycle takes much longer.

Bowman, which already supplies heat exchangers to many of the world's leading electric and hybrid marine propulsion manufacturers, can also provide cooling solutions for the charging infrastructure that will keep them operational. +