

High-speed powertrains

The integration of new technologies into an established range of high-RPM electric and hybrid powertrains opens the door to a number of vehicle applications

▶ A wholly owned subsidiary of Hydro-Québec established in 1998, TM4 develops and produces electric and hybrid powertrain systems that are generally targeted at platforms from passenger cars up to commercial trucks and buses. The first units of its Motive series of high-speed electric powertrain have been in production since 2009, but as a company driven by innovation, TM4 has never stopped enhancing its capabilities and extending the scope of its potential applications. Thanks to new products and innovations having been incorporated into this product line, TM4 will now extend its reach into many new promising markets.

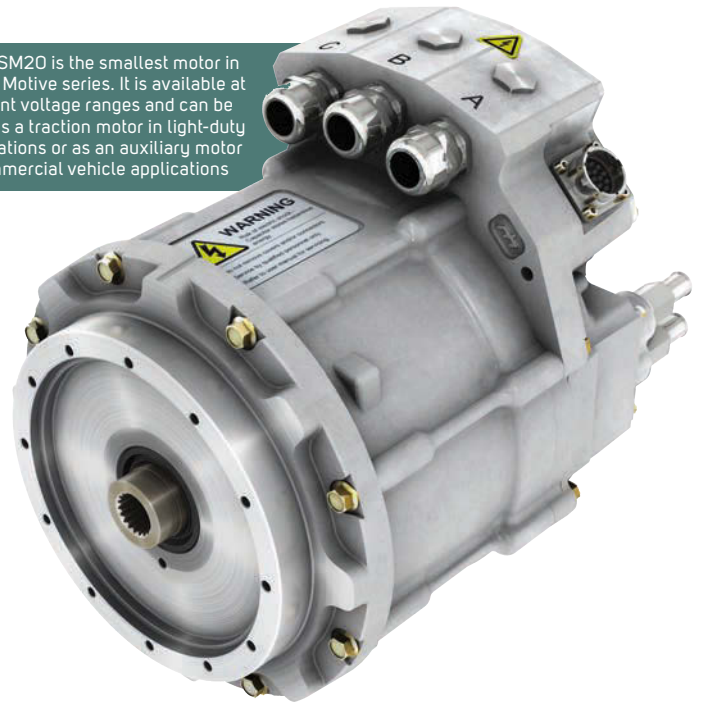
Building on a tradition of quality, performance and innovation, TM4 has managed to completely redefine its Motive high-RPM series of electric powertrains for cars and light-duty vehicles. As a matter of fact, the Motive series now consists of three motor variants with better performance than ever. For instance, by integrating new innovative technologies, TM4 has managed to increase its torque ratings by 50%, while retaining the same weights and dimensions. Based on a common diameter, these motors are paired with a choice of low- (<144V DC),

medium- (<450V DC) or high-voltage (>750V DC) inverters, therefore providing a wide range of electric vehicle propulsion systems. These compact motors can also be used as auxiliary motors inside buses and commercial vehicles.

In order to provide such combinations, TM4 has developed a brand new MOSFET-based motor controller and inverter unit, the CMW-96V, which delivers some of the industry's highest current ratings in its category. In fact, this new inverter manages to deliver an unmatched 850A_{rms} of peak current in a compact package, making it perfect for high-performance applications in light-duty vehicles. Whether it is for an on- or off-road application, this new product will meet TM4's automotive quality standards, given that ISO 26262 road vehicle functional safety standards have been taken into account during its development. In the low-voltage market (<144V DC), TM4 will be one of the few companies to be able to offer fully optimized motor and controller sets, as it designs and manufactures both systems.

The medium- and high-voltage motors available with this product line are driven by TM4's proven CO150 inverter platform, available

The HSM20 is the smallest motor in TM4's Motive series. It is available at different voltage ranges and can be used as a traction motor in light-duty applications or as an auxiliary motor in commercial vehicle applications



The MOSFET-based CMW-96V controller delivers high current ratings, and is targeted at high-performance applications



in both of these voltage ranges. This product, which entered mass production in 2013, has been proven in a number of high-profile projects. It is not only used with TM4's own motors, but with those of many other electric motor manufacturers. Since its launch, it has received praise for being one of the most affordable yet technologically advanced off-the-shelf inverters on the market. This is, in part, a result of TM4's proprietary Reflex gate driver technology, which allows it to provide, in some conditions, up to 100% more current than competing products while using the same IGBT modules.

TM4 is currently working with several OEMs, vehicle integrations and technical centers in North America, Europe and Asia on several types of electric and hybrid off-road, marine, automotive and

commercial vehicle applications. Production is undertaken at TM4's Canadian facility in Boucherville, as well as at Prestolite E-Propulsion Systems in Beijing, China. These facilities are all equipped with high-volume, flexible and automated production lines, as well as a large range of dynamometers and test cells in order to conduct full validation and certification of electric and hybrid powertrains, including electromagnetic interference/electromagnetic compatibility. Other products offered by TM4 include its Sumo series powertrains, which combine TM4's leading controller technologies with highly efficient direct-drive motors for commercial vehicles and buses. ☉

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