



Press Release M10

The Project

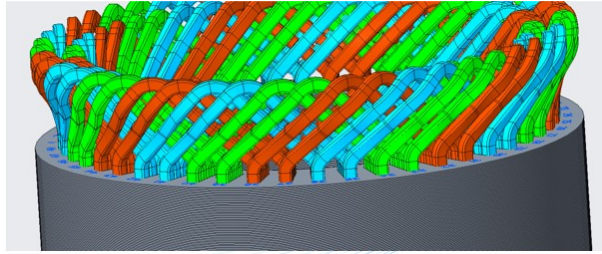
The VOLTCAR project aims to revolutionise electric traction motors with breakthrough in specific power, power density, sustainability, cost, and reliability. The project will enhance the specific power, material efficiency, durability, and cost-effectiveness of the electric traction motor, while also promoting its value in terms of sustainability through circular design and value chains and higher recycling rates, reducing the use of rare resources. In addition, the project will enhance the technical and manufacturing maturity of the technology via developing and validating a 50 kW and a 120 kW motor prototype that both meet the stringent criteria which are to deliver higher specific power and material efficiency, enhanced recyclability and circularity, and reduced use of rare resources and copper. Digital design and optimisation methods are used to assess life cycle costs, energy consumption, and carbon footprint, promoting sustainability and efficient recycling. The VOLTCAR project validates its 50 kW and 120 kW motor prototypes according to automotive standards using X-in-the-loop (XiL) experimentation. The VOLTCAR consortium includes top-tier automotive companies and research partners, guaranteeing the expertise needed for project success.

Project achievements

VOLTCAR project has achieved key milestones in designing compact, efficient motors with reduced rare materials, reinforced by sustainable practises through circular technologies. Key milestones so far are the developing a digitalised and durable motor to be tested and validated comprehensively in line with automotive standards.

Steps towards Obj. 1: Creation of highly compact and efficient VOLTCAR traction motors with reduced amount of rare materials for passenger cars and vans (nominal power 50-120 kW).

Key design choices for the initial prototypes have been made. The engineering of manufacturing and assembly aspects, including efficient liquid cooling, is in works. Modern technologies such as backlack lamination stacks (to maintain the structural integrity of the rotor while enabling the removal of the rotor ribs) and hairpin winding are being utilised to achieve this goal. Backlack lamination technology was selected due to its high reliability and mechanical stability, allowing good magnetic and thermal conductivity properties of the stack. This technology also supports meeting the automotive industrial standard. The drive system assembly includes a gearbox and a SiC inverter. The first 50 kW motor prototypes are expected to be finalised by summer 2024, with higher power prototypes planned for summer 2025.

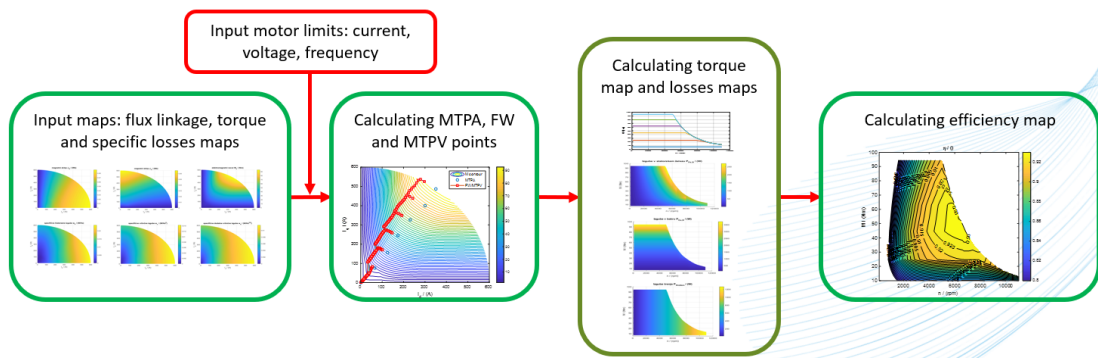


Steps towards Obj. 2: Development of circular technologies for next generation electrical traction motors.

Sustainability requirements and recyclability considerations, including Life Cycle Assessment (LCA) and Life Cycle Cost (LCC) analysis, are being integrated into the design process. First efforts have been made to enhance the mechanical strength of the permanent magnets to ensure intact reuse of the magnets. Initial tests on permanent magnet encapsulation have been conducted. Upcoming practical experiments will focus on the dismantling of existing traction motors.

Steps towards Obj. 3: Demonstration of a cost efficient, durable, over the life cycle digitalised motor.

Progress is being made in motor analysis and digital twinning approaches, covering not only design and operation but also production and dismantling phases.



Steps towards Obj. 4: Comprehensive testing and validation of VOLTCAR traction motors and systems according to automotive standards with advanced and virtual testing methodologies.

A detailed measurement plan is in development. Testing and simulation workflows will be established and verified using smaller-scale test setups before the VOLTCAR motors are ready.



Networking and knowledge sharing:

VOLTCAR consortium partners are committed to actively participate in networking activities with other relevant EU funded projects. A joint web-conference of the projects funded under the same call (MAXIMA, HEFT, VOLTCAR, and EM-TECH) was organised by MAXIMA on 24th of October 2023 on the subject “**Sustainable Drivers: Exploring Innovations in Green Vehicle Propulsion**”. The VOLTCAR project was presented by the Project Coordinator, Jenni Pippuri-Mäkeläinen from VTT. Future joint activities between the projects were discussed and the road for future collaboration was set.

VOLTCAR consortium meeting

The M6 General Assembly meeting of the VOLTCAR project was hosted by RTD Talos in Nicosia, Cyprus, where the progress of each work package was presented, and the next steps were planned for the upcoming period.

More information:

<https://voltcar-project.eu/>

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