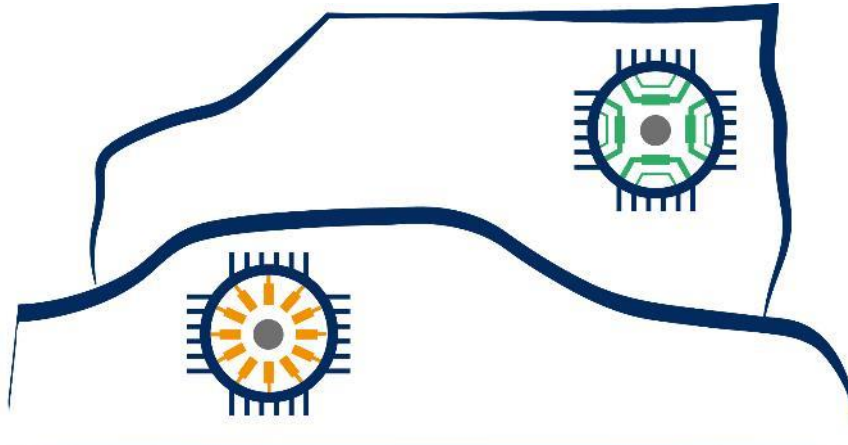




Rare Earth Free e-Drives Featuring Low Cost Manufacturing



ReFreeDrive

Collaborative Project

Grant Agreement Number 770143

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Deliverable no.: 7.3
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Lead contractor for this deliverable: PRI
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Executive Summary

This document is a description of the activities that have been carried out on the Mercedes Sprinter demonstrator after the end of work package (WP) 5. The purpose of the WP7 – Task 7.3 is to electrify the van to integrate the powertrain into the vehicle, bench testing of the powertrain components, testing the motors on the vehicle on the road. For simplicity, we have divided it into three main areas.

1. Integration:

This task is the set of activities (disassembly, new supports, new connections, new wiring, etc.) to electrify the van, based on the projects and guidelines already defined in deliverables 5.4 and 5.5. In particular, these activities had as main focus the realization of the high (HV) and low voltage (LV) wiring, the safety of the prototype and a motor installation system in the vehicle that ensures correct operation and also make it easier to exchange the drivetrain.

2. Test at component level:

Privé, before and during the integration, tested the battery and the main components of the vehicle in stand-alone conditions or on a test bench custom-designed for such activities. This allowed for faster debugging on the vehicle and reduced the risk of component failure.

3. Test at vehicle level:

This phase has been performed in two parts. The first had as main concern the debugging of the vehicle parameters and the optimization of the communication between all the components. In the second part, the final tests were carried out aimed at acquiring the data that were used for the characterization of the motors and the electronics.

The task initially scheduled from month 25 to month 36 of the project, due to delays in the previous WPs owing to Covid-19, has been extended by 6 months.

The task involved testing the 4 motors of 75 kW produced in the project (Induction Motor (IM) die-cast, IM fabricated, Permanent Magnet (PM) assisted and Pure Synchronous reluctance (Synrel) motor) due to the delays already mentioned and unexpected issues it was possible to test only one motor, the pure Synrel.

The testing of the pure Synrel motor aboard the electrified Mercedes-Benz Sprinter was successfully performed. The tests gave good driving sensations at low speeds, thanks to the good torque of the e-motor. However, the maximum speed reached by the vehicle/motor and the cooling system performance are lower than the expected ones.