EDA-B 1518 GEM3 GP

HYBRID DRIVE TRAINS FOR MILITARY PURPOSE - HYBRIDT

Participating Members

Consortia/Organization

Electro mobility is increasingly being pushed into the market in close combination with the regenerative energy transformation of the commercial electricity supply chain. This will affect not only the procurement of new units, but above all, the supply of spare parts and the technical knowledge for repair and maintenance.
Once a certain number of civilian vehicles will be equipped with partial or full electric drives, vehicle manufacturers will likely reduce the current variety of internal combustion engines or even withdraw from the internal combustion engine powertrain market due to declining sales. This trend away from the internal combustion engine is currently establishing itself, also through the ongoing and internationally observable political discussions, which could in the future take up the issue of registration bans for new vehicles with internal combustion engines.
Since there are large differences between the requirements of civilian vehicles with an electric drive and those in the military field, civilian technology cannot be adopted in the military sector without far-reaching adjustments. In some cases, even an adaptation of corresponding civilian systems cannot be implemented with the current state of the art and thus a partial or complete electrical drive for the military field of application cannot be represented.

Objectives

The objective of HybriDT is to derive a generic system architecture from basic investigations, identify technology gaps for all military land vehicle classes and their mobility domains and design a full-scale demonstrator project (phase 2).
The objectives of the project are to:

- classify vehicle weights and mobility domains;
- identify tactical and operational mobility requirements for vehicle classifications;
- develop a generic system architecture;
- derive technology requirements from classification;
- identify commercial developments, including perspectives, availabilities and technology gaps for military mobility needs; and
- set-up recommendations for a follow-on project.

The desired end state of HybriDT will be approached and organized in two work phases: phases 1 and 2. This Project is covering only phase 1, herein after denoted "The Project", where a design of full-scale demonstrator project (phase 2) will be developed.

Work Strands

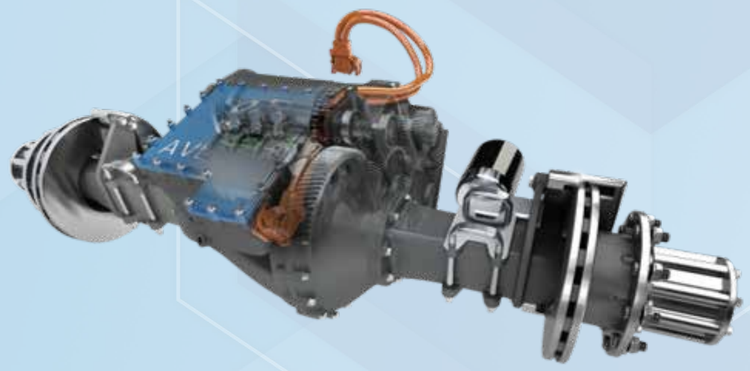
The project is currently in the closing phase. All the deliverables have been presented and are being used to prepare the second phase.
The goal of this study was the identification and field of application for electric storage, conversion, and propulsion components for a specific range of military vehicles. Furthermore, it was attempted to show which classes of vehicles could be equipped with electric drive components. The study also aimed at describing standard requirements for each core subassembly of a (semi) electric propulsion system, in order to adapt resulting vehicle architecture to progress made in the state of the art.
The existing and identified gaps could be described in different categories: weight and volume issues, lifetime, safety, and production capabilities. The gap categories were reviewed for every component of the architecture (e.g., Internal Combustion Engine, Electric machine with inverters, Battery). At the end, possible solutions to close the gap were identified by the work package team members.

Way Ahead

HybryDT II (Phase 2) is already under preparation and is intended to be started in early 2022.
The aim of HybriDT II is to design full-scale wheeled and tracked military-purpose demonstrators with hybrid drive trains and to verify simulation results, allowing for tactical and logistic testing of new technologies, based on HybriDT I results.
Wheeled vehicles will be the main focus of the project, and 8×8 and 6×6 IFVs will be considered. Tracked vehicles will also be considered in the first stage of research.
Decision for specific vehicle categories beyond the categories analysed in HybriDT I, after further analysis in a simulated environment, should be based on the most pressing future requirements of contributing Member States. The simulation approach will be flexible and may be adjusted to cMS vehicle fleets. The project partners will conduct additional detailed simulations at the national level in line with national requirements and the inputs of respective component suppliers. As a result, source codes of each simulated component should be delivered to consortium members, enabling the use of different simulation platforms and supporting the optimization of selected components. Partners will deliver program code of components in their chosen programming language.
The project will ultimately identify the best modular and scalable hybrid architecture technology for military purposes, ensuring significant weight saving, space claim, thermal radiation reduction and fuel consumption reduction. The potential to be derived from Commercial Off The Shelf (COTS)-components will also be investigated.
The optimal level of electrical output shall be decided based on the need for it to be used in different vehicle categories and will be in the range of about 500 kW.
In a third phase (HybriDT III), still to be defined and prepared, one or more demonstrators will be developed and tested according to the results obtained in HybriDT II.

Link to TBBs, other CapTechs, and other links

- OSRA TBB 55 – Alternative fuels and drive/propulsion systems
- OSRA TBB 57 – Engine and power distribution system efficiency technologies
- OSRA TBB 58 – Energy management technologies: innovative and efficient systems
- OSRA TBB 74 – Land Systems Architecture & Integration
- OSRA TBB 75 – Power generation, storage and management for Land Systems
- OSRA TBB 82 – Mobility and Counter-Mobility



Credits - AVL, Electrified Powertrain & Drivetrain Engineering, Jul 2019

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EDA Activities
www.eda.europa.eu/what-we-do/all-activities