

ELECTRIFICATION SOLUTIONS FOR DEFENSE

Development from System Specification to Start of Production

The Electrification of the Powertrain is a powerful enabler to reduce weight of next generation military vehicle systems and to increase their mobility, survivability and combat readiness. The availability of appropriate high electrical energy levels on vehicle systems allows military forces to maintain superior capability over adverse forces by integrating disruptive technologies for mission-to-role kit and drivetrain solutions.

CUSTOMER CHALLENGE

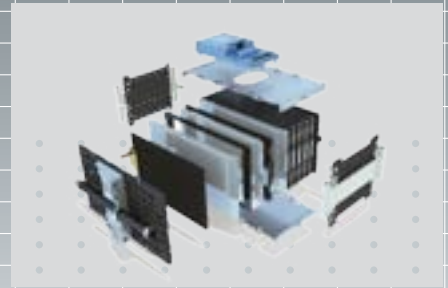
- Increasing armor- and mine protection requirements result in substantially higher combat weights. An increased power demand, reduced off-road mobility and difficulties to deploy vehicle systems into mission require alternative solutions
- Mission success depends on an overmatching capability of fielded vehicle systems to counter the increasing abilities of adverse forces
- Survivability of vehicle and crew is directly dependent on detectability, including noise, heat and silhouette
- Modern C4ISR systems, high performance jamming devices and the availability of next-generation weapon systems exceed available electrical power levels. Auxiliary Power Units add additional weight and consume valuable space
- Fuel delivery to the battlefield is costly and dangerous, so high efficiency in mobile and stationary energy production is paramount to reduce the logistic footprint
- High cost of modern vehicle systems lead to high modularity requirements to allow for the adaptation to various mission requirements. Conventional powertrain architectures only provide limited flexibility in vehicle design



E-DIFFERENTIAL



ADVANCED COMBAT ENGINE



BATTERY SYSTEM

AVL SOLUTION

Electrification technologies enable substantial weight savings on vehicle powertrain level by downsizing the engine and the powerpack. High power density e-motors and high-speed dedicated e-transmissions contribute to that target, whilst ensuring increased vehicle performance. The high electrical system power ensures flexibility to install existing and future mission to role kits.

AVL's integrated real time simulation and development tool chain enables customers to compare different powertrain architectures in the virtual world and to identify the optimal solution on system and element level at the earliest stages of development. Thus, a fast time to market, high maturity of design and reduced total development cost is realized whilst fulfilling all mission requirements of the military end-user. Exemplary architectures include:

WHEELED ARMORED VEHICLES (4X4, 6X6, 8X8)

- Serial Hybrid or Powersplit architecture
- Fully Integrated E-Axle or
- Hybrid CVT Transmission maintaining conventional driveline
- Increased mobility with Silent Move capability
- Downsized ICE
- Electric boost power

UNMANNED GROUND VEHICLES

- E-Axle or Wheel Hub Motors dependent on requirements
- Range extender with Fuel Cell or ICE
- Range 180km, 600km with Range Extender

RAPID INTERVENTION VEHICLES

- Serial Hybrid or Powersplit architecture
- Modular Power Unit with scalable battery module sizes & range extender options
- Full Silent Move capability

INFANTRY FIGHTING VEHICLES (TRACKED)

- Powertrain weight reduction by 30%
- Serial Hybrid Powertrain architecture
- High power density downsized Diesel Engine
- Dedicated E-Transmission integrating multiple high power density E-Motors for propulsion, steering and torque transfer
- High freedom for powertrain integration into vehicle

ABOUT AVL

AVL is the world's largest independent company for development, simulation and testing technology of powertrains (hybrid, combustion engines, transmission, electric drive, batteries and software) for passenger cars, trucks, military vehicles and large engines.

DEVELOPMENT OF POWERTRAIN SYSTEMS

AVL develops and improves all kinds of powertrain systems and is a competent partner to the engine and automotive industry. With AVL Special Purpose Powertrain, AVL has established a dedicated group to address the specific requirements in the design, engineering and realization of powertrain systems for defense applications.

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