

Transition

SBIR Topic Number:
 AF02-278

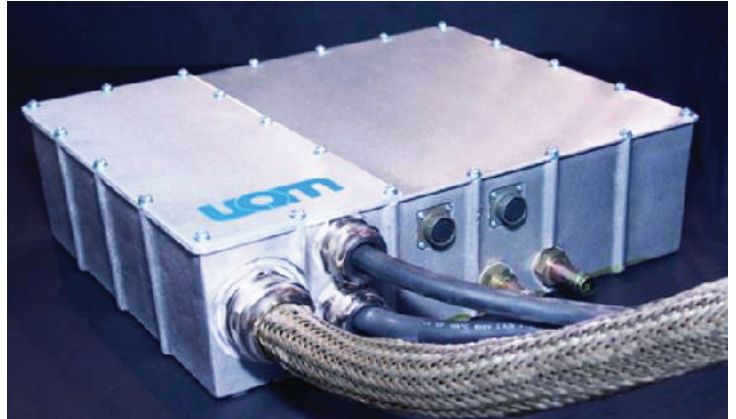
SBIR Title:
 Advanced Electric Vehicle Research

Contract Number:
 FA8501-07-C-0034

SBIR Company Name:
 UQM Technologies, Inc.
 Frederick, CO

Technical Project Office:
 Warner Robins Air Logistics Center,
 Robins AFB, GA

An example of Air Force supported SBIR/STTR technology that has been transitioned into an Air Force or other DoD system or subsystem or used by Air Force test ranges and facilities or maintenance depots.



Electric propulsion components for electric vehicles

Advanced Electric Vehicle Propulsion Technology

- The demand for vehicles powered by electric drive technology is growing due to today's more stringent requirements dealing with emissions, energy efficiency, and economics
- Propulsion technology has been applied to the Manuever Sustainment Vehicle and the Future Tactical Truck System Utility Vehicle prototype
- SBIR project resulted in development of a high power and low electromagnetic interference propulsion motor, a parking brake mounted to the output of the electric machine, electric vehicle control algorithms, and a lithium battery pack
- Benefits include improved fuel economy and performance of utility vehicles due to the higher torque and response time

Commercialization Pilot Program Series

WR-ALC 08-01004

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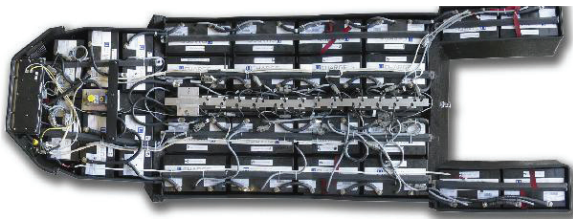
Air Force Requirement

The demand for vehicles powered by electric drive technology is growing due to today's more stringent requirements dealing with emissions, energy efficiency, and economics.

In order to reduce requirements for fossil fuels, the Air Force needs battery electric vehicles for on-base use, and lithium-ion battery technology enables sufficient range and performance to create utility for such vehicles. A logical first application of new electric vehicles is within short-range fleet operations, making on-base vehicles a good choice for military evaluation of the technology. With successful demonstration of lithium battery electric vehicles, these technologies become candidates within a wide variety of military electric and hybrid electric platforms.

SBIR Technology

The SBIR technology developed by UQM Technologies, Inc. (UQM) consists of creating a high power, low electromagnetic interference (EMI) propulsion motor, parking brake mounted to the output of the electric machine, and electric vehicle control algorithms. The program also included the selection and implementation of a lithium battery pack.



Battery Box Components

The program successfully developed the drive motor featuring regenerative braking, advanced drive electronics and controls, and parking brake technologies. Though overcome, integration of some COTS equipment, such as the battery pack and charging equipment, presented challenges to the program due to the relative immaturity and lack of internal control of these items.

Transition Impact

For the Department of Defense, UQM propulsion technology is being implemented across a variety of vehicle demonstrators intended to become part of future

acquisitions. Energy storage is the key technology that is not yet ready for high volume fielding of these vehicles. The propulsion technology, part of which was funded by this SBIR, has been applied to the Manuever Sustainment Vehicle built by Stewart & Stevenson (now BAE Systems) and a Future Tactical Truck System Utility Vehicle prototype. In addition, the technology has found its way into the following applications:

- Two additional electric vehicles for the Air Force
- Unmanned ground combat vehicles
- Commercial hybrid electric buses
- Commercial electric trucks

As the battery pack, battery management, and charging technologies improve in maturity, the propulsion hardware will have a further payoff for the Air Force by creating fielded electric and hybrid electric vehicle fleets. These vehicles increase the electric power availability for use by the military through auxiliary power outlets, improve fuel economy nearly 4:1 due to the capture of energy loss with regenerative braking and the lower cost of electricity versus fossil fuels, and improve the performance of these vehicles due to the higher torque and response time available from electric propulsion. All of these items are high impact improvements for the Air Force and the U.S. military. UQM is continuing to work with the Air Force to improve the technology for better performance (e.g., higher temperature operation for desert use through advanced materials for controls) and for lower acquisition cost.

Company Impact

William G. Rankin, CEO of UQM stated, "This Air Force SBIR topic showed tremendous foresight, targeting the demonstration of electric vehicles before the revival in commercial interest that has now led to the formation of Tesla Motorcars and the General Motors Volt, among others. The program focused on advanced traction drive motors and advanced lithium-ion batteries, the two keys to successful electric vehicles."

UQM is a developer and manufacturer of power dense, high efficiency electric motors, generators and power electronic controllers for the automotive, aerospace, medical, military and industrial markets. A major emphasis of the company is developing products for the alternative energy technologies sector including propulsion systems for electric, hybrid electric, plug-in hybrid electric and fuel cell electric vehicles, under-the-hood power accessories and other vehicle auxiliaries and distributed power generation applications.

William G. Rankin, CEO
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SBIR/STTR

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