

Fuel-Saving Design and Systems Engineering Lead to Innovative Solutions

DRIVELINE

The FED Alpha vehicle is powered by a modern CUMMINS 4.5L ISB engine optimized for fuel efficiency and designed to burn JP-8 fuel. The transmission is a 6-speed automatic from Aisin. A number of the driveline components, including the transmission, transfer case and differentials, were treated with a superfinishing process from REM Chemical. The superfinishing decreases the friction between gears and increases the fuel efficiency of the entire driveline. Ricardo also removed the wheel-end reduction units that are typically found on trucks. The absence of gear sets eliminates friction and losses in the entire system.



INTEGRATED STARTER-GENERATOR (ISG)

Between the engine and transmission Ricardo included a Kollmorgen 24-volt ISG. This motor will start the vehicle and then produce up to 30kW of power for vehicle and military equipment loads. Because of high electrical power output requirements, most of the engine accessory drives have been removed from the engine belt and replaced with electric pumps and motors. Electric pumps and motors can be run only when needed, reducing parasitic losses, and can be more easily packaged away from the front of the engine.



LIGHTING

The lighting systems for both the FED Alpha vehicle as well as the FED Bravo feature LED headlamps, side markers, backup lighting and blackout lights. The FED vehicles use Truck-Lite systems, which are already DoD-approved components on several combat platforms. LED headlamp systems typically feature longer life, increased durability and minimal power consumption (about 4kW) when compared to conventional truck lighting systems.



TIRES

Rolling resistance is the term for the amount of drag force caused as the tire treads press against the road while driving. Reducing drag leads to better fuel efficiency. The Goodyear Custom Compound Low Rolling Resistance Tires on the FED Alpha vehicle feature a tread design, depth and compound to reduce this energy loss and boost miles-per-gallon numbers. These new 22.5-inch military tires could account for 7.8 percent fuel economy gains over conventional military tires.



SEATS

The FED Alpha vehicle uses GSS Cobra Blast Attenuating Seats, which are designed with blast mitigation for military tactical vehicles. Systems have weight sensors to adjust the level of energy absorption to the Soldier in the seat.



LIGHTWEIGHT STRUCTURE

The Lightweight Aluminum Monocoque Armored Cab and underbody blast shield on the FED Alpha vehicle is designed to be "lighter, faster and stronger," according to its supplier, Alcoa Defense. The Alcoa alloy increases strength, durability and ballistic performance while also reducing weight.



BRAKES

The brake calipers on the FED Alpha vehicle use Performance Friction Brakes Zero-Drag technology, which eliminates brake drag for fuel savings, increases pedal response and improves component life. These brake systems have been proven in motor racing and are built with lightweight materials that maintain stiffness and durability.



ACCELERATOR

A Force Feedback Pedal sends cues when the driver pushes the accelerator too hard or too often. In the FED vehicles, the Continental Teves Accelerator Force Feedback Pedal will help the driver find the pedal position ensuring the highest possible fuel economy. This device is important because even the most advanced fuel economy systems can be undermined by a driver with a lead foot.

