



THE OPPOSED-PISTON ENGINE

The Ultimate Engine for Military Applications



achatesPOWER™
Fundamentally Better Engines®

THE OPPOSED-PISTON ENGINE: THE ULTIMATE ENGINE FOR MILITARY APPLICATIONS

Modern military vehicles need an updated, efficient, fuel-flexible engine to reduce logistics cost and burdens, provide operational adaptability and - most importantly - protect the warfighter. Achates Power has partnered with Cummins to power the next generation of military tactical and combat vehicles.

Low heat rejection, lower fuel consumption and increased power density are all part of the OP Engine package. The engine is modular and scalable, allowing a wide range of variants from a 4.0L 300 hp engine to a 20.0L 1500 hp engine, using common architecture and parts.

A WINNING COMBINATION

The synergy between Cummins and Achates Power is poised to bring the Opposed-Piston (OP) Engine to market for military applications. Cummins brings diesel engine design and manufacturing expertise and its vertically integrated systems, supply chain, distribution and support, while Achates Power leverages more than \$100 million of private investment in OP Engine innovation and development to create the most capable combat engine. The two companies will fully develop and begin testing a next-generation engine by 2019.



THE OPPOSED-PISTON ENGINE OFFERS:

The U.S. Army focuses on the development of a modular and scalable advanced combat engine capable of very low heat rejection, increased fuel economy, excellent durability and outstanding overall propulsion system power and density.

The OPE offers increased design and packaging flexibility for more armor, weapons, power, speed and range - optimizing for survivability like never before. Fewer logistic operations will be required, as the engine is up to 30 percent more fuel efficient than current options.

The Army is investing in an engine platform that will give it leap-ahead ground vehicle capability for the next century.



A light-duty configuration of the OP Engine suggests a 30% fuel economy improvement

REDUCED HEAT REJECTION

+ At equivalent displacement, OP Engines have 30 percent lower surface-to-volume ratio

INCREASED POWER DENSITY

+ Two-stroke cycle provides a power stroke in each cylinder during each crankshaft revolution

INCREASED EFFICIENCY

- + Early, fast and lean combustion at the same boost levels
- + Earlier and faster combustion from lower heat release density
- + Reduce pumping work due to larger flow area, uniflow scavenging and flexible air charge control

REDUCED LOGISTICS BURDEN

- + Increased range and reduced cost
- + More Power...Speed...Acceleration
- + Greater crew and equipment capacity



THE OPPOSED-PISTON ENGINE HISTORY

Opposed-Piston Engines are the platform for next-generation capability

Originally created in the late 1800s, the Opposed-Piston (OP) Engine has long been noted for its efficiency and power density. In the early 1900s, Hugo Junkers developed the Junkers Jumo, an engine used in World War II Air Force planes, and a variant of the architecture was used in Russian Kharakov tanks. The U.S. Army began a comprehensive study of the engine and its overall architecture, concluding it was the best, most efficient engine for the military.

In 2004, Achates Power was founded and began to modernize the OP Engine. Under U.S. Army contract, an engineering team started working on single- and multi-cylinder engine variants. In 2014, Cummins and Achates Power began an ongoing partnership to design, build, test and commercialize a new family of combat engines for the US Army by 2021.



Clean, Efficient, Cost Effective

The OP Engine is modular and scalable, allowing a wide range of variants from a 4.0L 300 hp engine to a 20.0L 1500hp engine, using common architecture and parts. Low heat rejection, lowered fuel consumption and increasing power density are all part of the package.



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