

ARPA-E Awards Grant for Hybrid Opposed-Piston Engine

Achates Power and University of Michigan partner to develop single-cylinder OP Engine

SAN DIEGO and ANN ARBOR, MI, March 6, 2019 - Achates Power has announced that it was awarded \$2 million in funding from the U.S. Department of Energy's Advanced Research Projects Agency-Energy (ARPA-E) for the development of a Highly-efficient Opposed-Piston Engine for Hybrid Vehicles. Achates Power has partnered with the University of Michigan and Nissan Motor Company., Ltd. for the project.

"The project builds on the successful development of the OP Engine and expands our research and development into the hybrid and range-extender market," said Fabien Redon, Chief Technical Officer, Achates Power. "The inherent balance and power characteristics of the OP Engine makes it an ideal powertrain in a hybrid solution, providing vehicle manufacturers a cost-effective solution to improve vehicle fuel efficiency and reduce carbon dioxide (CO₂) emissions."

The Hybrid OP Engine project will develop a unique single-cylinder OP Engine design with the goal to minimize energy losses typical in conventional internal combustion engines. A motor-generator integrated on each engine crankshaft will provide independent control to each piston and eliminate all torque transmitted across the mechanical crankshaft connection, thus reducing engine size, mass, cost, friction, and noise. The application of high-bandwidth power electronics will further improve engine efficiency through the real-time control of the piston motion and combustion process.

"I am excited to design and optimize the controls that will free this opposed-piston engine from the mechanical constraints of the crank and gear mechanism through the electric motors; it is like breaking the shackles and unleashing its true potential," said Anna G. Stefanopoulou, Energy Institute Director and Professor of Mechanical Engineering, University of Michigan. "Along with the freedom, though comes the responsibility of highly precise control and coordination of the piston motions to maximize efficiency and ensure a smoother operation."

The University of Michigan Energy Institute will contribute engineering resources and talent in the design and testing of the Highly-efficient Opposed-Piston Engine for Hybrid Vehicles, the project will look to leverage Nissan Motor Company., Ltd. experience in hybrid engine development.

About Achates Power, Inc.

The Achates Power Opposed-Piston Engine is engineered to meet future emissions and fuel economy standards more cost effectively than any other solution. Founded in 2004 with the mission to build cleaner, more efficient engines, the company has an experienced staff of engineers and scientists working with leading engine manufacturers to bring the OP Engine to market. Achates Power is backed by the Oil and Gas Climate Initiative, Climate Investments; Sequoia Capital Partners; RockPort Capital Partners; Madrone Capital Partners; InterWest Partners; and, Triangle Peak Partners. For more information, visit www.achatespower.com, www.facebook.com/AchatesPowerInc, www.twitter.com/achatespower and www.youtube.com/achatespowerinc.

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