



Valve Method Cuts Engine Emissions, Boosts Combustion

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a method to reduce pollutant emissions from internal combustion engines.

OVERVIEW

In four-stroke engines, intake and exhaust valves open during the engine cycle to introduce air into the combustion chamber prior to combustion, and to release exhaust gases once combustion is complete. Valves are typically opened and closed by a mechanical cam-drive mechanism, with timing dictated by rotation of the engine's crankshaft.

In recent years, a technique called variable valve actuation (VVA) was introduced that uses an electronically controlled solenoid to open and close valves. Unlike the mechanical cam system, VVA allows valves to be opened at chosen times and to varying degrees during the combustion cycle. This technique could be leveraged to help both SI (spark ignition or gasoline) engines and CI (compressed ignition or diesel) engines meet stringent emissions standards.

THE INVENTION

UW-Madison researchers have developed a way to exploit the flexibility of VVA and reduce pollutant emissions from internal combustion engines.

Their method employs VVA to open valves not only during the intake and exhaust strokes (as in conventional engines), but also at optimal times during the compression and/or power strokes. Briefly opening the valves at these times promotes turbulence and more fuel-air mixing in the combustion chamber, resulting in much greater soot oxidation.

Any unburned fuel or particulates that escape through open valves via the intake manifold will be ingested during the next engine cycle and thus won't contribute to emissions. Also, to reduce the loss of combustion chamber pressure (and thus engine power) while the valves are open, the length of time they are open can be minimized easily with VVA.

THE WARF ADVANTAGE

Since its founding in 1925 as the patenting and licensing organization for the University of Wisconsin-Madison, WARF has been working with business and industry to transform university research into products that benefit society. WARF intellectual property managers and licensing staff members are leaders in the field of university-based technology transfer. They are familiar with the intricacies of patenting, have worked with researchers in relevant disciplines, understand industries and markets, and have negotiated innovative licensing strategies to meet the individual needs of business clients.



BUSINESS OPPORTUNITY

- The gasoline and diesel engine manufacturing markets top \$55 billion in the United States, with expected annual growth through 2016

APPLICATIONS

- Reduction of emissions from internal combustions engines

KEY BENEFITS

- Promises to reduce soot emissions by accelerating soot oxidation prior to the exhaust stroke
- Allows control over ignition timing by tailoring chamber pressure
- Provides a much simpler and less expensive method to promote combustion chamber mixing than previous technologies
- Could help diesel engines meet tough emission standards without the need for after-treatment devices
- Can be readily implemented with other emission control technologies, such as those that reduce nitrogen oxides
- May potentially increase fuel economy
- Applicable to any internal combustion engine (SI or CI)

ADDITIONAL INFORMATION

Related Portfolios

[Reactivity Controlled Compression Ignition Technology Portfolio](#)

Tech Fields

Clean Technology - Transportation

Engines & Power Electronics - Automotive

CONTACT INFORMATION

For current licensing status, please contact Emily Bauer at emily@warf.org or 608-960-9842.

