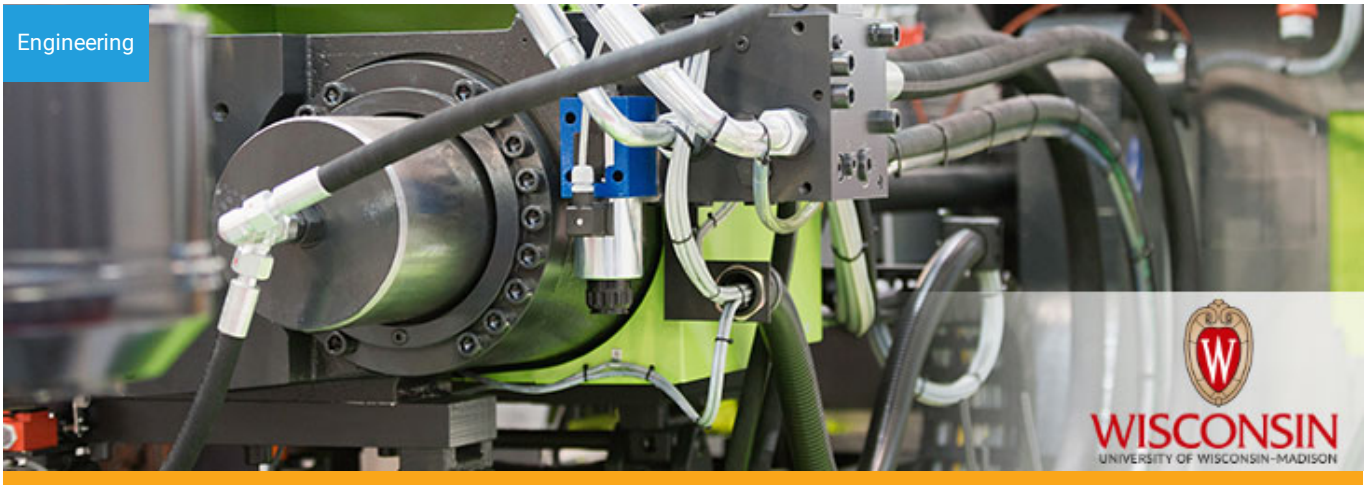
Engineering



Improved Compression Ignition Combustion in Rotary Engines for Higher Efficiency and Lower Pollutant Emissions

View U.S. Patent No. 9,057,321 in PDF format.

WARF: P110320US01

Inventors: Rolf Reitz, Sage Kokjohn

The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a reactivity controlled compression ignition combustion method for rotary engines that enhances engine efficiency and reduces emissions.

Overview

UW–Madison researchers previously disclosed a Reactivity Controlled Compression Ignition (RCCI) system for improving fuel efficiency and lowering emissions in compression ignition, internal combustion engines. The technology uses a mixture of fuels with different reactivities to control a more efficient combustion process within the engine's cylinders.

Most automobiles use reciprocating engines (i.e., piston based), however, rotary engines are of interest because they are relatively compact and light-weight compared to reciprocating-piston engines having similar output. A rotary engine is a type of internal combustion engine in which a rotor rotates within a housing and one or more combustion chambers are formed between the rotor and housing. Although rotary engines have many advantages, they also have poor fuel efficiency and high levels of pollutant emissions, which have prevented their widespread adoption. Improving diesel engine efficiency also has been an area of interest because diesel engines tend to be more efficient than gasoline engines and provide higher power output per fuel consumption, but again disadvantages are seen in terms of high pollutant emissions. An improved engine that maximizes efficiency and minimizes pollutant emissions is needed.

The Invention

The UW–Madison researchers now have adapted their previous RCCI method for use in rotary engines. The system comprises a rotor with a circumference having two or more rotor faces where a chamber is defined between each rotor face and the housing. A similar fuel mixture method is used in which a first fuel charge is provided to one of the chambers and then a second fuel charge with different reactivity is provided to a different location in the chamber containing the first fuel charge so as to set up an optimal reactivity stratification. The chamber receiving the first and second fuel charges lacks a spark plug or other spark source; thus, the fuel charge having higher reactivity initiates combustion within the chamber.

Applications

- Rotary engines for cars, motorcycles, planes, personal watercrafts, power generators and small engines used in products such as lawnmowers and chainsaws
- Hybrid and compact vehicles

Key Benefits

- Enhanced efficiency

- Reduced emissions
- Can be implemented in a lightweight and compact rotary engine
- Significant reduction in combustion temperatures
- Low unburned fuel
- Low NO_x and particulate (soot) emissions

Additional Information

For More Information About the Inventors

- Sage Kokjohn

Related Technologies

- See WARF reference number P100054US01 for a compression engine combustion process to reduce diesel engine emissions.

Tech Fields

- Engineering : Engine technologies

For current licensing status, please contact Michael Carey at mcarey@warf.org or 608-960-9867