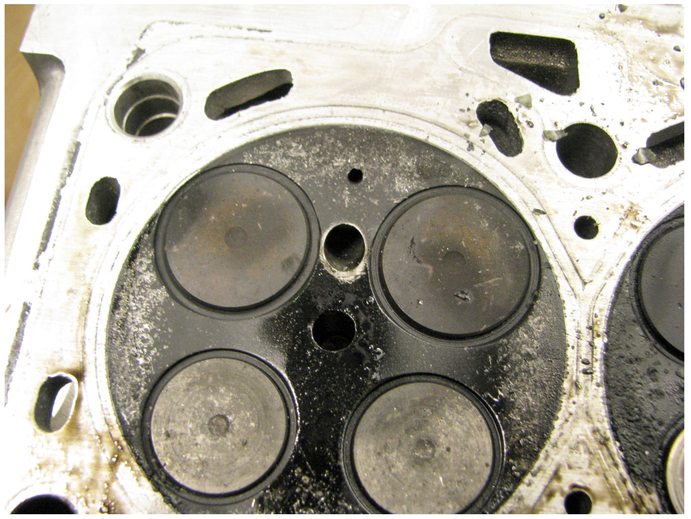
LOW-TEMPERATURE COMBUSTION
Knocks out the NO_x

Did you know...

Diesel engines require less maintenance, generate power more efficiently, and produce less carbon dioxide emissions than traditional gasoline engines. However, they still emit relatively high levels of nitrogen oxide (NO_x) and particulate matter (PM), which are considered harmful to humans and the environment.

OPPORTUNITY

With stringent U.S. Environmental Protection Agency (EPA) regulations in place for diesel engines, automakers are interested in solutions that reduce emissions and the cost of after-treatment devices. One way to achieve this is by lowering combustion temperatures. However, most current approaches to low-temperature combustion (LTC) have problems with engine performance.



Using endoscopic access into the cylinder head, researchers can peer inside an engine as it operates. This image shows the endoscope sleeve in the low-temperature combustion engine.

Argonne engineer Steve Ciatti inspects diagnostic instruments to insure proper operation of the low-temperature combustion engine.

SOLUTION

To optimize LTC, detailed combustion information is needed. Argonne researchers are using endoscopes, advanced cameras, and fiber-optic tools to obtain information on fuel spray characteristics and combustion reactions and temperatures. The ultimate goal is to define conditions that will enable high engine efficiency and reduced emissions.

BENEFITS

Low-temperature combustion can result in ultra-low outputs of NO_x and PM. The reduced emissions will allow for much smaller and less expensive after-treatment devices, resulting in lower vehicle costs for the consumer. LTC systems could also potentially increase fuel efficiency (compared to conventional gasoline spark-ignition engines) by as much as 25 to 50 percent.

INDUSTRY PARTNERSHIPS

Argonne is working with General Motors, BP and the University of Wisconsin-Madison to develop LTC technology into a usable system for automobiles.

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