Improving engine performance and efficiency by minimisation of knock probability (MINKNOCK)

Wyniki w skrócie

Understanding engine knock

The Energy, Environment and Sustainable Development Programme funded a comprehensive study of flame behaviour inside automobile engines in order to learn about engine knock and how it can be prevented.

ENERGY

© Shutterstock

The problem of engine knock has been around since the inception of internal combustion engines. The premature ignition of the air-fuel mixture causes unnecessary engine wear, reduces power output and increases emissions of harmful air pollutants.

The MINKNOCK project sought to address the lack of knowledge surrounding engine knock. It is a complex issue involving engine geometry, fuel characteristics, flame propagation to name but a few factors. Mechanical engineers with the Instituto Superior Tecnico in Portugal constructed an experimental set-up complete with Particle Image Velocimetry (PIV) equipment to closely monitor the conditions inside the combustion chamber.

Data collection and analysis focused on the flame-wall interaction for three types of

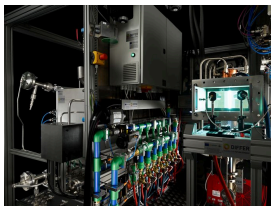
flames: hemispherical, symmetrical and non-symmetrical. New post processing software enabled the estimation of flame velocity (Sd) and the flame stretch factor (K).

The MINKNOCK experiments showed that, contrary to popular belief, stagnation points do exist in the flow field inside the combustion chamber. The positions of the stagnation points, where regions of unburned fuel exist, were determined for each type of flame geometry. In addition, a high correlation between flame velocity and stretch factor was observed. Finally, and most importantly, the research revealed that flames are remarkably robust, able to survive large positive and negative stretching without being extinguished.

The MINKNOCK consortium will use this new knowledge to improve engine design with the aim of reducing engine knock, helping Europe's legendary automobile industry remain globally competitive.

Znajdź inne artykuły w tej samej dziedzinie zastosowania

Retrofit projects designed in a day for a city district



Synthetic kerosene from renewable sources could power the transition to zero-emission flying

Cost-effective biofuels production could slash transport's global warming potential

Geothermal system innovations benefit buildings large and small

Informacje na temat projektu

MINKNOCK

Identyfikator umowy o grant: ENK6-CT-2002-00643

Projekt został zamknięty

Data rozpoczęcia
1 Stycznia 2003

Data zakończenia
31 Grudnia 2005

Finansowanie w ramach
Programme for research, technological development and demonstration on "Energy, environment and sustainable development, 1998-2002"

Koszt całkowity
€ 2 855 978,00

Wkład UE
€ 1 637 330,00

Koordynowany przez
DAIMLERCHRYSLER AG
Germany

Ten projekt został przedstawiony w...

MAGAZYN RESEARCH*EU

Results Supplement No. 021

MAGAZYN RESEARCH*EU

Results Supplement No. 003

MAGAZYN RESEARCH*EU

Results Supplement No. 001

MAGAZYN RESEARCH*EU

Results Supplement No. 004

Ostatnia aktualizacja: 17 Grudnia 2007