

Reduction of Methane Emissions in Gas Engines

Reference No: B78197

CHALLENGE

Reducing methane emissions is vital for tackling climate change in the short-term, a major UN report says. Methane persists for just a short time in the atmosphere - unlike carbon dioxide - but methane is a much more potent global warming gas than CO₂.¹ Main anthropogenic methane sources are agriculture and the energy sector including coal, oil, gas and biomass. It is important to tackle all sources of methane emissions arising from human activity, but there are reasons to focus on emissions from oil and gas operations. First, the largest source of emissions within the energy sector are oil and gas operations. Second, as methane has commercial value, emission reduction can result in economic savings or can be carried out at low cost.²

The presented technology contributes to this effort by offering a means for the reduction of methane emissions by large gas engines.

INNOVATION

In the inventive engine, the liquid natural gas is ignited by injecting a small amount of diesel fuel. Clean combustion is achieved by directing the gas back to its entrance point after the injection. By this beam deflection method an advantageous gas air mixture is generated near the injector where it is initially ignited. Subsequently, the ignition expands in the opposite direction of the gas flow. As a result, the rich areas of the gas beam become leaner and thus provide a clean combustion process.

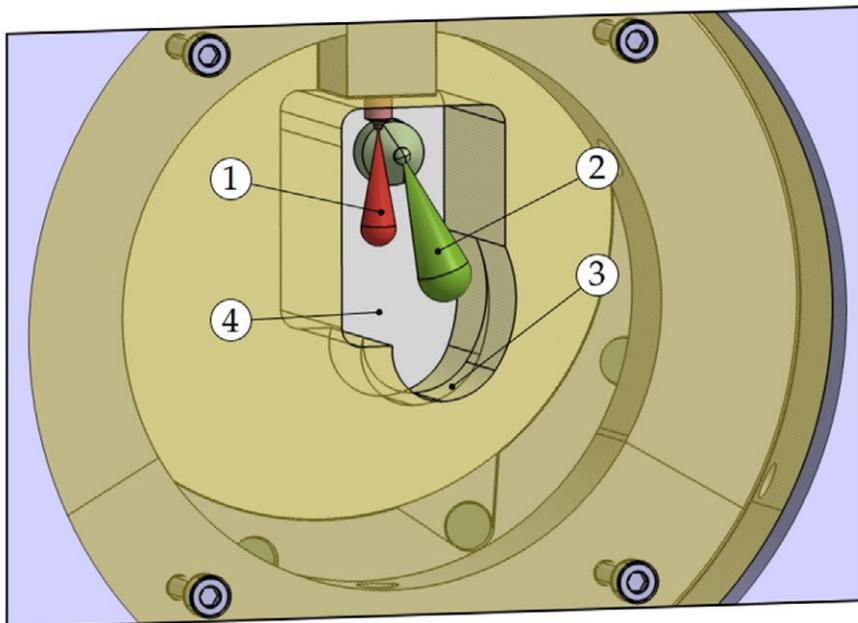


Figure: Realization of a wall-bounded natural gas jet by an additional part mounted to the rapid compression-expansion machine cylinder head: 1 diesel pilot jet, 2 natural gas jet, 3 jet deflection with small step, 4 surface mirror for shadow graph imaging.³

COMMERCIAL OPPORTUNITIES

The invention is relevant to large volume direct injection engines like marine or truck engines.

DEVELOPMENT STATUS

The invention was tested in numerical simulations and first experiments.

REFERENCES:

- 1 <https://www.bbc.com/news/science-environment-56933443>
- 2 <https://www.iea.org/reports/methane-tracker-2020>
- 3 <https://www.mw.tum.de/fileadmin/w00btx/td/Forschung/Dissertationen/fink2021.pdf>

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DE filed in 2019
PCT filed in 2020

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