

Accepted Manuscript

Investigations on the combustion duration and ignition delay period of a dual fuel diesel engine with hydrogen and producer gas as secondary fuels

A.E. Dhole, R.B. Yarasu, D.B. Lata

PII: S1359-4311(16)31065-1

DOI: <http://dx.doi.org/10.1016/j.applthermaleng.2016.06.151>

Reference: ATE 8562

To appear in: *Applied Thermal Engineering*

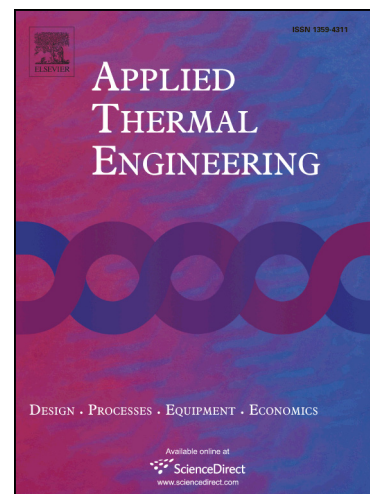
Received Date: 21 November 2015

Revised Date: 23 May 2016

Accepted Date: 22 June 2016

Please cite this article as: A.E. Dhole, R.B. Yarasu, D.B. Lata, Investigations on the combustion duration and ignition delay period of a dual fuel diesel engine with hydrogen and producer gas as secondary fuels, *Applied Thermal Engineering* (2016), doi: <http://dx.doi.org/10.1016/j.applthermaleng.2016.06.151>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Investigations on the combustion duration and ignition delay period of a dual fuel diesel engine with hydrogen and producer gas as secondary fuels

A. E. Dhole^{a,*}, R. B. Yarasu^a, D. B. Lata^b

^aResearch Scholar, Department of Mechanical Engineering, Government College of Engineering, Amravati, Maharashtra 444603, India.

^bDepartment of Mechanical Engineering, Birla institute of Technology, Mesra, Ranchi 835215, India.

*Corresponding author: Phone no.+91-9404242407
email: ananta172002@yahoo.co.in (A. E. Dhole)

Abstract

This paper presents an experimental investigation on the combustion duration and ignition delay of a dual fuel diesel engine using hydrogen, producer gas and mixture of producer gas and hydrogen in different proportion as a secondary fuel with diesel as pilot fuel at wide range of load conditions. Experiments were conducted on a 4 cylinder turbocharged and intercooled 62.5 kW gen-set diesel engine at constant speed of 1500 RPM. It was found that, at lower load condition when only hydrogen is used as 30% secondary fuel, the combustion duration is increased by 2.5°C A and ignition delay by 2°C A. Moreover, at 80% load condition and for 50% of hydrogen substitution maximum reduction in combustion duration is 5°C A whereas, ignition delay decreases. The maximum increment in combustion duration at 80% load condition for 50% of producer gas substitution is 9°C A while for ignition delay it is 6°C A. In mixed fuel mode (PG+H₂) (Case IV), the combustion duration and ignition delay are lesser than when producer gas alone (Case III) is used as fuel. Further, mixture combination of PG:H₂=(60:40)% is found to be the most suited one at which the combustion duration and ignition delay are in good comparison to that of pure diesel operation. Additionally, it is observed that the ignition delay of dual fuel engine depends not only on the type of gaseous fuels and their concentrations but also on charge temperature, pressure and oxygen concentration.

Keywords: Dual fuel engine, Alternative fuels, Hydrogen, Producer gas, Combustion duration, Ignition delay.

1. Introduction

Experimental investigations on performance and emissions of a dual fuel diesel engine using hydrogen and producer gas (produced from rice husk) as secondary fuels [1] and mathematical modeling on performance and emissions of a dual fuel diesel engine using hydrogen [2] and producer gas [3] as secondary fuel have been reported by the authors. The developed models have been used to predict the performance and emission parameters of diesel-hydrogen dual fuel operation in various combinations at different loads. Moreover, combustion duration and ignition delay also changes by gaseous fuel substitutions. Since, these parameters in dual fuel engine are of more importance and hence it becomes necessary to be analyzed. Hence, this paper presents experimental results on the combustion duration and ignition delay of a dual fuel turbocharged multi-cylinder diesel engine with Hydrogen (Case II), producer gas (Case III) and mixture

Download English Version:

<https://daneshyari.com/en/article/7047195>

Download Persian Version:

<https://daneshyari.com/article/7047195>

[Daneshyari.com](https://daneshyari.com)