

Accepted Manuscript

Design and development of a direct injection system for cryogenic engines

Angela Mutumba, Kevin Cheeseman, Henry Clarke, Dongsheng Wen

PII: S0011-2275(17)30212-6

DOI: <https://doi.org/10.1016/j.cryogenics.2017.12.009>

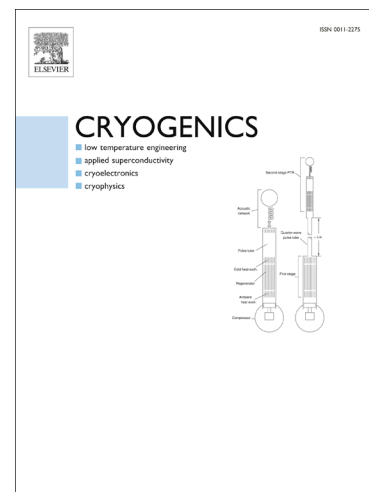
Reference: JCRY 2769

To appear in: *Cryogenics*

Received Date: 3 July 2017

Revised Date: 9 November 2017

Accepted Date: 30 December 2017



Please cite this article as: Mutumba, A., Cheeseman, K., Clarke, H., Wen, D., Design and development of a direct injection system for cryogenic engines, *Cryogenics* (2017), doi: <https://doi.org/10.1016/j.cryogenics.2017.12.009>

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.

Manuscript Details

| | |
|--------------------------|---|
| Manuscript number | CRYOGENICS_2017_163_R1 |
| Title | Design and development of a direct injection system for cryogenic engines |
| Article type | Research paper |

Abstract

The cryogenic engine has received increasing attention due to its promising potential as a zero-emission engine. In this study, a new robust liquid nitrogen injection system was commissioned and set up to perform high-pressure injections into an open vessel. The system is used for quasi-steady flow tests used for the characterisation of the direct injection process for cryogenic engines. An electro-hydraulic valve actuator provides intricate control of the valve lift, with a minimum cycle time of 3 milliseconds and a frequency of up to 20 Hz. With additional sub-cooling, liquid phase injections from 14 - 94 bar were achieved. Results showed an increase in the injected mass with the increase in pressure, and decrease in temperature. The injected mass was also observed to increase linearly with the valve lift. Better control of the injection process, minimises the number of variables, providing more comparable and repeatable sets of data. Implications of the results on the engine performance were also discussed.

Keywords Cryogenic engine injection; Liquid nitrogen; Hydraulic valve actuator; Thermal energy storage; Zero emission engine

Corresponding Author Angela Mutumba

Corresponding Author's Institution University of Leeds

Order of Authors Angela Mutumba, Dongsheng Wen, Henry Clarke, Kevin Cheeseman

Suggested reviewers Yulong Ding

Submission Files Included in this PDF**File Name [File Type]**

Title page.docx [Cover Letter]

Reply to Reviewers.docx [Response to Reviewers]

Design development of a direct injection system for cryogenic engines....pdf [Revised Manuscript with Changes Marked]

Highlights.docx [Highlights]

Design and development of a direct injection system for cryogenic engines.pdf [Manuscript File]

Figure 1.JPG [Figure]

Figure 2.jpg [Figure]

Figure 3.jpg [Figure]

Figure 4.jpg [Figure]

Figure 5.jpg [Figure]

Figure 6.jpg [Figure]

Figure 7.jpg [Figure]

Figure 8.jpg [Figure]

Figure 9.jpg [Figure]

Figure 10.jpg [Figure]

Figure 11.jpg [Figure]

Download English Version:

<https://daneshyari.com/en/article/7915623>

Download Persian Version:

<https://daneshyari.com/article/7915623>

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