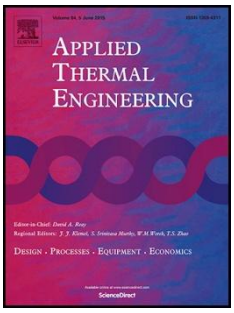
Accepted Manuscript



Title: Optimization of fuel injection in GDI engine using economic order quantity and lambert w function

Author: Robert Ventura, Stephen Samuel

PII: S1359-4311(16)30157-0
DOI: http://dx.doi.org/doi: 10.1016/j.applthermaleng.2016.02.024
Reference: ATE 7753

To appear in: *Applied Thermal Engineering*

Received date: 17-10-2015
Accepted date: 4-2-2016

Please cite this article as: Robert Ventura, Stephen Samuel, Optimization of fuel injection in GDI engine using economic order quantity and lambert w function, *Applied Thermal Engineering* (2016), http://dx.doi.org/doi: 10.1016/j.applthermaleng.2016.02.024.

Optimization of Fuel Injection in GDI Engine Using Economic Order Quantity and Lambert W Function

Abbreviated title: GDI Engine Control and Optimization

Robert Ventura, Stephen Samuel
Department of Mechanical Engineering and Mathematical Sciences, Oxford Brookes University, Oxford, UK

Address correspondence to Stephen Samuel, Faculty of Technology, Design & Environment, Department of Mechanical Engineering and Mathematical Sciences, Oxford Brookes University, Wheatley Campus, OX33 1HX UK.
Phone: + 44 1865 483513; email: s.samuel@brookes.ac.uk

Highlights

- EOQ approach for fuel injection event in GDI engine has been evaluated.
- Analogy between EOQ and fuel injection and combustion process has been drawn.
- Components that contribute to the loss of energy in the system have been modelled using EOQ.
- A fuel injection control strategy has been proposed using EOQ and Lambert W function.

ABSTRACT

The present work evaluated the suitability of Economic Order Quantity (EOQ), commonly used in supply chain management and process optimization, for combustion in Gasoline Direct Injected (GDI) engines. It identified appropriate sub-models to draw an analogy between the EOQ for melon picking and fuel injection in GDI engines. It used experimental data from in-cylinder combustion processes for validating the model. It used peak cylinder pressure and indicative mean effective pressure for validating the model; the R^2 value for linear correlation between the experimental value and estimated value is 0.98. This work proposes that the EOQ based on Lambert W function could be employed for optimizing the fuel quantity in GDI engines for real-world fuel economy.

KEYWORDS: *Fuel consumption, Economic Order Quantity, Lambert W function, Gasoline Direct Injection*

NOMENCLATURE

ANN	Artificial Neural Network
DISI	Direct Injection, Spark Ignition
ECU	Electronic Control Unit
EOQ	Economic Order Quantity
GDI	Gasoline Direct Injection
MVT	Marginal Value of Time
PFI	Port Fuel Injection
SMD	Sauter Mean Diameter
THC	Total hydrocarbon