



“Gheorghe Asachi” Technical University of Iasi, Romania



---

## FEASIBILITY OF ADDING FUSEL OIL AS AN OXYGENATE TO GASOLINE ON REDUCING MPFI ENGINE EMISSIONS

Gopinath Dhamodaran<sup>1\*</sup>, Ganapathy Sundaram Esakkimuthu<sup>2</sup>,  
Thennarasu Palani<sup>3</sup>, Ramesh Krishnan<sup>4</sup>

<sup>1,2</sup>Department of Mechanical Engineering, Velammal Engineering College, Chennai, India;

<sup>3</sup>Department of Automobile Engineering, Velammal Engineering College, Chennai, India

<sup>4</sup>Department of Mechanical Engineering, St. Joseph's Institute of Technology, Chennai, India

---

### Abstract

Fusel oil is a by-product of bioethanol production during the fermentation process and is a natural amyl alcohol source. It has the appearance of an efficient alternative fuel for use in gasoline engine. This study investigates the effect of adding fusel oil to gasoline on the properties of gasoline – fusel oil blend and the performance, emission and combustion characteristics of MPFI gasoline engine. Fusel oil is blended with gasoline in a ratio of 10%, 20% and 30% by vol (F10, F20 and F30). Addition of fusel oil with gasoline produced lower density, lower calorific value, and higher oxygen percentage and research octane number (RON) of the gasoline-fusel oil blend. The study found that for all engine speeds F30 blend produced higher brake thermal efficiency as compared to gasoline, 15.12% higher BTE is observed in F30 blend at 2800 rpm. Lower Hydrocarbon (HC) and carbon monoxide (CO) emissions are observed with gasoline-fusel oil blends as compared to gasoline, but NO<sub>x</sub> is observed with higher value. Even though NO<sub>x</sub> increasing with increase in the fusel oil percentage in the blend, the study found that gasoline-fusel oil blend produced lower NO<sub>x</sub> as compared to other gasoline- oxygenates blends. F30 blend produced higher peak in-cylinder pressure.

**Keywords:** carbon monoxide, octane number, oxygenates, unburned hydrocarbon

*Received: January, 2022; Revised final: April, 2022; Accepted: July, 2022; Published in final edited form: July, 2022*

---

---

\* Author to whom all correspondence should be addressed: e-mail: [gopi.vlr6@gmail.com](mailto:gopi.vlr6@gmail.com), Phone: +40745058313