# بسم الله الرحمن الرحيم


MONA MAGHRABY


# شبكة المعلومات الجامعية

# التوثيق الالكتروني والميكروفيلم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

# جامعة عين شمس

# التوثيق الإلكتروني والميكروفيلم

# قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

# يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار

***MONA MAGHRABY***


Ain Shams University

Faculty of Engineering

Mechanical Power Department

# Investigating the performance of a diesel engine operated by different Biodiesel blends

A Thesis submitted in partial fulfillment of the requirements of the degree of Master of Science in Mechanical Engineering
(Mechanical Power Engineering)

By

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Bachelor of Science in Mechanical Engineering

(Aerospace Engineering)

Faculty of Engineering, Cairo University, 2010

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# Statement

This thesis is submitted as a partial fulfilment of Master of Science in Mechanical Engineering (Mechanical Power Engineering), Faculty of Engineering, Ain Shams University.

The author carried out the work included in this thesis, and no part of it has been submitted for a degree or a qualification at any other scientific entity.

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# Abstract

The fossil fuel depletion is expected to be in this century around the year 2070. The global concern to prevent this disaster and delaying its occurrence was to find an alternative source of energy that must be natural and renewable. Biodiesel is the natural and renewable alternative fuel for the mineral diesel. The cost of biodiesel is comparatively higher than that of the mineral diesel, this is due to the raw material from which biodiesel is prepared, mainly the vegetable oil. To solve this dilemma, waste vegetable cooking oil can be used to produce biodiesel. In this study, biodiesel was prepared at the Faculty of Science – Ain Shams University by transesterification method. The oil used in preparing biodiesel was waste vegetable cooking oil, that was collected from restaurants. Biodiesel was mixed with mineral diesel by volume to get the following biodiesel – diesel blends: (B0, B10, B20 and B30). A single cylinder compression ignition engine (Deutz F1L511) was used with diesel injector of injection pressure of (180, 200 and 230 bar). The performance of the engine and the emissions were studied for every blend at every injection pressure. The experiment was done according to DIN 70020. The thermal efficiency of the engine increased by increasing injection pressure and increased with biodiesel blends used. The torque and power were decreased by using biodiesel blends, but both were improved by increasing the injection pressure to 200 bar. The brake specific fuel consumption (bsfc) increased by increasing the percentage of biodiesel in the blend, but it decreased by increasing the injection pressure to 200 bar. The CO emissions decreased by using biodiesel blends and decreased by increasing the injection pressure to 200 bar. The NOx emission increased by using biodiesel blends and it also increased by increasing the injection pressure. From this study the optimum performance was obtained when B20 and injection pressure 200 bar were used.

**Keywords:** Waste Cooking Oil, Biodiesel, Injection Pressure, Compression

Ignition Engines, Exhaust, Emissions.