AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING

AN INVESTIGATION OF PERFORMANCE AND POLLUTION FOR SPARK IGNITION ENGINES USING GASOLINE - ALCOHOL BLENDS AS A FUEL

By
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Thesis

Submitted in Partial Fulfilment of the Requirements for the Degree of

Master of Science

in

Mechanical Engineering

UNDER THE SUPERVISION OF

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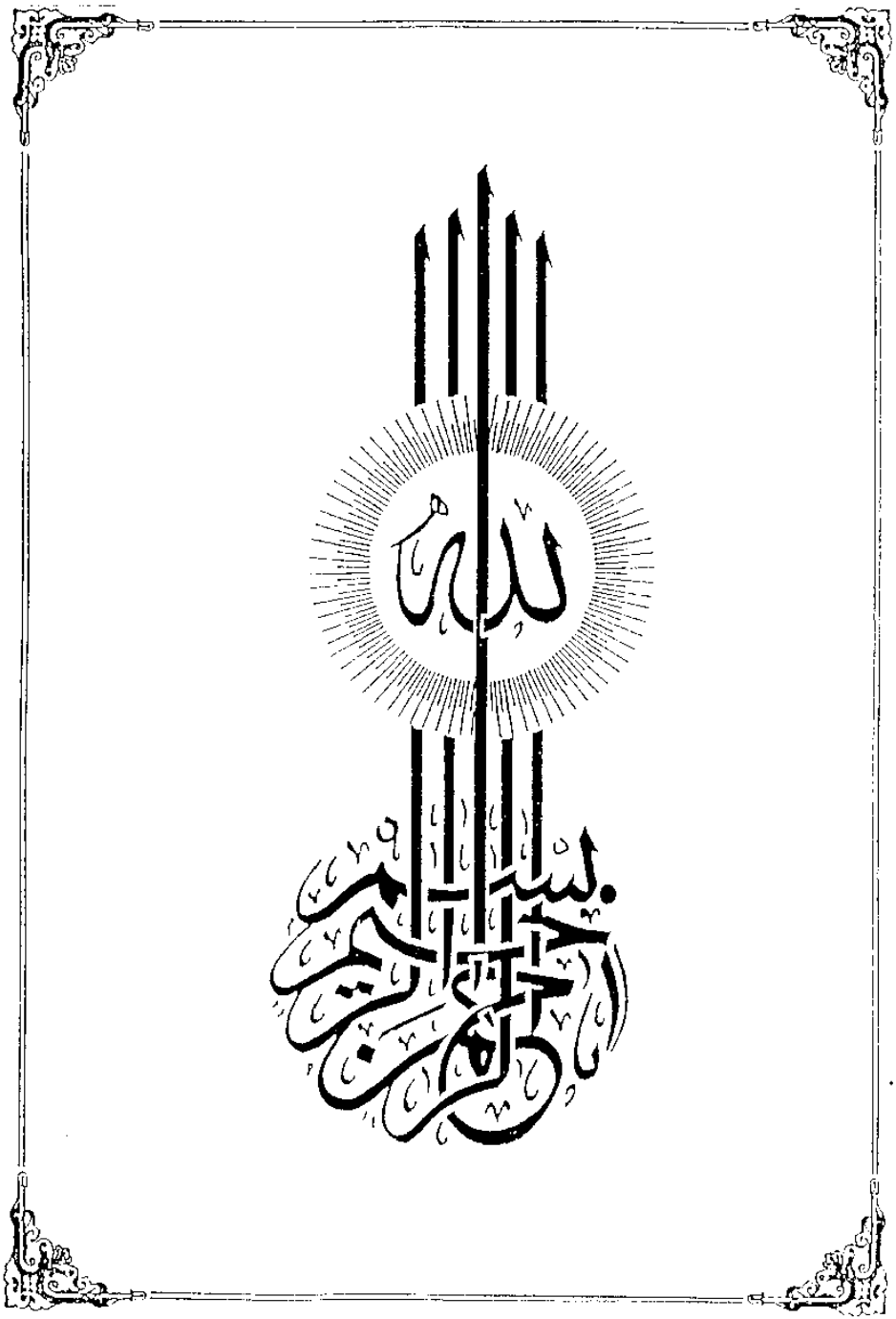
وقل اعملوا فسيرى الله عملكم ورسوله والمؤمنون

صدق الله العظيم



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PREFACE

This dissertation is submitted to Ain Shams University for the degree of Master of Sience in Mechanical Engineering.

The work included in this thesis was carried out by the author in the Thermal Power Section, Department of Mechanical Power & Energy, Military Technical College from june 1993 to june 1995

No part of this thesis has been submitted for a degree at any other university.

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ABSTRACT

In the present work, an investigation of performance and pollution for spark ignition engine using gasoline-ethanol blends as a fuel is carried out. The study was performed for different percentages of ethanol (from 0 to 15%) in the blends, at variable engine speeds (from 1000 to 5000 rpm with a step of 500 rpm) and different conditions of throttle positions (from 25% to 100%).

The tested engine was 4 cylinder, 4 stroke with spark ignition type " Fiat-1300 ".

The tests were carried out to evaluate the engine power, engine torque, volumetric efficiency, brake thermal efficiency, fuel - air equivalence ratio, specific fuel consumption, heat rate, exhaust gas temperature and exhaust gas contents.

When increasing ethanol content in the blend, the experimental work revealed the following results:

1-The engine power is improved over the whole range of speeds and loads, also the engine torque increases at the medium speed range (of about 3000 rpm) but slighter improvement has been achieved at lower speeds, less than 3000 rpm.

2- The heat rate (specific heat consumption) seems to have a slight decrease while there was an increase in the brake thermal efficiency.

3- The volumetric efficiency slightly increases while the fuel - air equivalence ratio slightly decreases. The exhaust gas temperature decreases for ethanol percentages more than 10%.

4- The quantity of carbon monoxide diminishes while the amount of carbon dioxide emitted becomes greater.

5- The hydrocarbon emission slightly increases while a slight decrease in nitric oxide has been achieved.

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I present this work to my wife and sons " sherief and Rasha ". for their patience, understanding, encouragement and sacrifice.

CONTENTS

LIST OF FIGURES