

**AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING**

**IMPROVEMENT OF THE PERFORMANCE
OF I C E AT DIFFERENT OPERATING CONDITIONS
USING ADVANCED METHODS OF ELECTRONIC
IGNITION**

by

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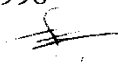
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ABSTRACT :

Lean mixture combustion is considered as one solution for the reduction of exhaust emissions because of the low concentration of nitrogen oxides as well as carbon monoxide in the exhaust gas. Also it reduce the fuel consumption.

The purpose of this work is to construct an ignition system suitable to be used with lean mixtures which leads to less pollutants in the engine exhaust as well as better engine efficiency and power .

- a) The first stage was directed to design and construct a modified electronic ignition system with improved specifications, such as; two energy levels for the spark (high, 111 mJ / low, 84.5 mJ), wider spark gap, sensitive for the mixture strength (lean / rich), automatic spark advance and spark energy change.
- b) In the second stage a series of tests was conducted on a Peugeot S I E of four cylinders having 1976 cm³ swept volume and maximum power of 58 kW (1968), once with the conventional Spark Ignition System and then with the modified electronic system .

The effects of spark plug and ignition system variables upon the engine performance were investigated.

In this study, the effects of spark plug gap width, spark energy, and spark duration were investigated for various engine air-fuel ratios, especially, in the lean mixture region.

In addition to studying each variable independently, the interactions between the variables were also investigated experimentally.

The engine performance parameters measured were: exhaust emissions, specific fuel consumption, engine speed roughness of operation and engine power.

Results showed that the engine produced a better performance with the modified high spark energy ignition system, especially if the spark

plug gap was increased to about 1.25 mm. In this case, the engine produced lower exhaust emissions, lower specific fuel consumption, smoother engine operation, and higher engine power.

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