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EXPERIMENTAL ANALYSIS OF 4-STROKE SI ENGINE WITH ETHANOL BLENDING AND EXHAUST ANALYSIS

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ABSTRACT

In today days the pollution problem more critical and increasing rapidly. S.I. engine emits more pollutants in the form of hazard's gases and fuel and fuel consumption is also needs minimum with high efficient engine so to overcome this we done some test on emission control and performance testing on set up.

These tests are carried out by adding some percentage of ethanol in petrol. These results giving us better results to overcome above problems. The invention is related to the technical investigation where the effective utilization of fuel by internal-combustion engine and reduction of ecologically harmful exhausts at their work is required. The offered design has a concrete purpose. The purpose of the invention is to increase the efficiency of fuel combustion of fuel in the S.I. with improvement of their ecological characteristics.

Keywords: Spark Ignition Engine, Ethanol, petrol, Break Thermal Efficiency, Ethanol Blending.

I.INTRODUCTION

The global fuel crisis has triggered the awareness amongst many countries to focus on the development of alternative fuels. An extensive worldwide search is underway for alternative fuels to replace the conventional oil based fuels. The main reason is the increased prices, the very limited resources for such fossil fuels and increasing stringent environmental regulations

Over the past century, need and development of micro-power devices have necessitated the need for studies to look the mediums that can enhance combustion processes of fuels by optimizing system parameters. This is essential so as to utilize the high specific energy content of liquid hydrocarbon fuels. As we know that main source of pollution is carbon monoxide and unburnt hydrocarbons so apparatus is develop which is used as pre-processing unit for the automobile mainly. This method is used for reducing the emissions and improving the performance of an internal combustion engine. An input air stream is separated into an oxygen-enriched air stream.

II. EXPERIMENTAL SET UP

Setup: Four Stroke SI Engine

III. ENGINE SPECIFICATION

Product	Engine test setup 3 cylinder, 4 stroke, petrol
Engine	Make Maruti, Model Maruti 800, Type 3 Cylinder, 4 Stroke, Petrol (MPFI), water cooled, Power 27.6kw at 5000 rpm, Torque 59 NM at 2500rpm, stroke 72mm, bore 66.5mm, 796 cc, CR 9.2;1
Dynamometer	Type Hydraulic
Propeller shaft	With Universal Joints
Fuel tank	Capacity 15 lit with Glass Fuel Metering Column
Calorimeter	Type Pipe in Pipe
Temperature Sensor	Thermocouple, Type K
Temperature Indicator	Digital, Multi Channel With Selector Switch
Speed Indicator	Digital With Non Contact Type Speed Sensor
Load Sensor	Load Cell, Type Strain Gauge, Range 0-50kg
Load Indicator	Digital, Range 0-50kg, and Supply 230V AC
Oxygen Rotameter	0-150 LPM For O2 Flow measurement
Oxygen Cylinder	140 Pounds Wt,
Pump	Type Mono-block
Overall Dimensions	W 2000 x D 2750 x H 1750 mm
Water Supply	Continuous, Clean and Soft Water Supply @ 4000 LPH, at 10m. Head. Provide Tap With 1" BSP Size Connection
Space	3500Lx4000Wx2000H in mm
Drain	Provide Suitable Drain Arrangement (Drain pipe 65 NB/2.5" size)
Exhaust	Provide Suitable Exhaust Arrangement (Exhaust pipe 32 NB/1.25" size)
Fuel, oil	Petrol @ 10 Liters Oil @ 3.5 lit. (20W40)

IV. RESULT AND DISCUSSION

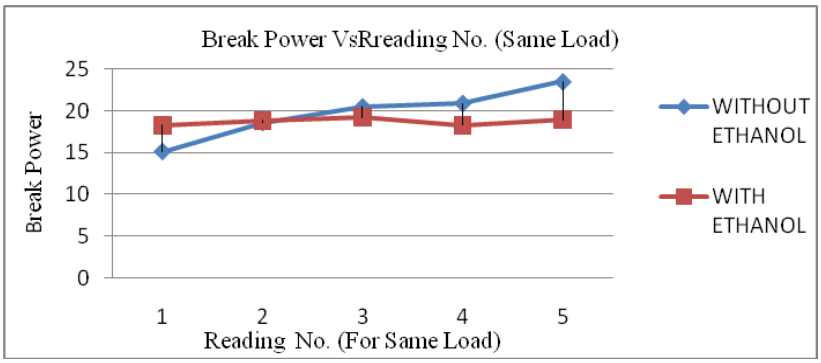
Without Ethanol Blending (Petrol): -

Brake power (Kw)	BMEP (Bar	Torque (N.m)	BSFC kg/kw H	B. Thr. eff. (%)	Air flow (kg/hr)	Vol. eff. (%)	A/F Ratio
11.4	8.34	53.2	0.321	25.49	54.4	95.2	14.9
15.1	8.83	56.3	0.304	26.88	69.5	97.1	15.1
18.6	9.07	57.9	0.293	27.95	83.0	97.0	15.3
20.5	8.77	55.9	0.288	28.37	94.2	96.1	15.9
20.9	7.78	49.6	0.335	24.40	103.6	92.2	14.8

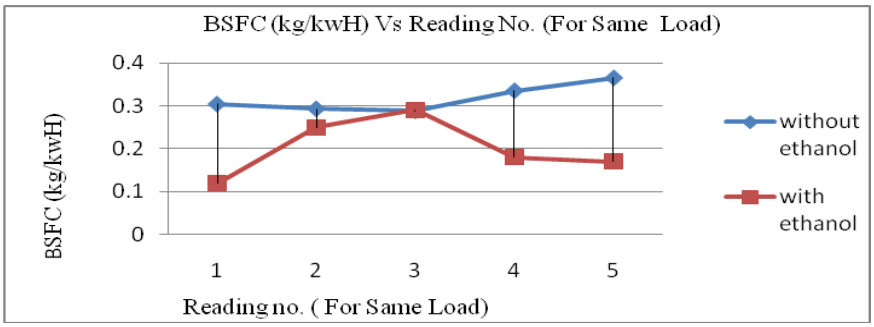
With Ethanol Blending (Petrol + Ethanol 15%)

Brake power (Kw)	BMEP (Bar)	Torque (N.m)	BSFC kg/kwH	BTh.eff. (%)	Air flo–w (kg/hr)	Vol. eff. (%)	A/F Ratio
18.33	9.09	53.36	0.119	42.83	52.15	96.1	16.8
18.83	9.39	55.13	0.25	32.08	72.48	97	15.3
19.21	9.86	57.87	0.29	28.47	84.45	97.1	15.9
18.26	8.79	51.60	0.18	44.72	51.57	96.1	15.9
18.94	8.42	49.44	0.17	47.67	48.1	92.32	14.38

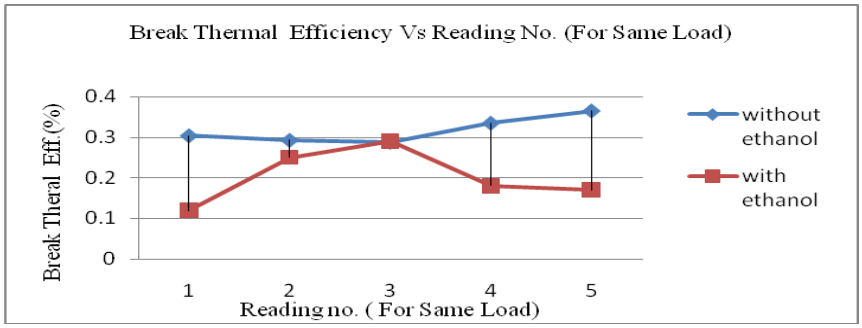
1)COMPARISON BETWEEN WITH ETHANOL AND WITHOUT ETHANOL GRAPHS



Graph 1.1 (a)



Graph 1.2 (b)



Graph 1.3 (c)

2) EXPERIMENTAL RESULT OF EMISSION PARAMETER

2.1) Without Ethanol Blending

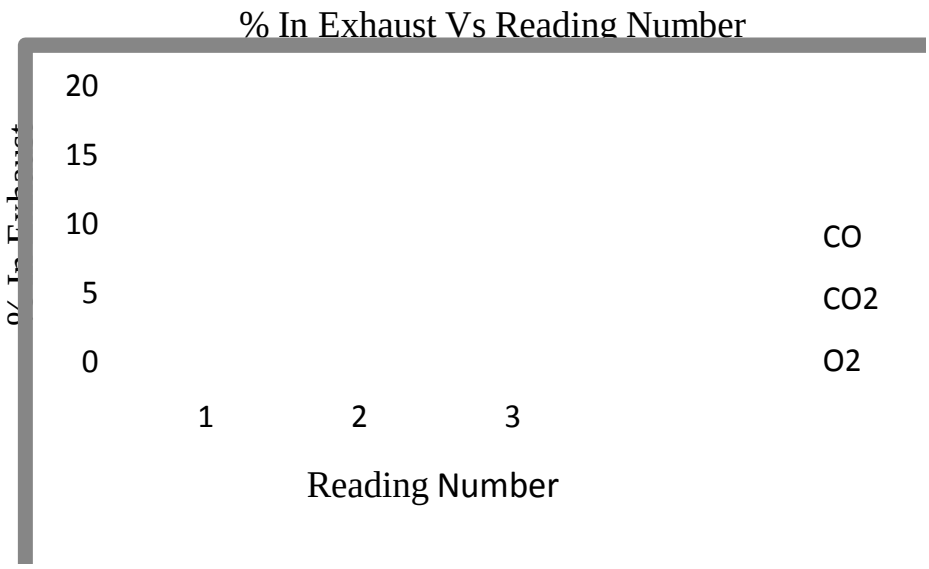
Sr. No.	RPM	CO %	HC PPM	CO2 %	O2 %
1	7556	2.1	1440	4.2	15.2
2	5028	2.4	1470	4.8	15.4
3	4940	2.3	1460	4.6	15.3

Table 2.1 (a): Without Ethanol Blending

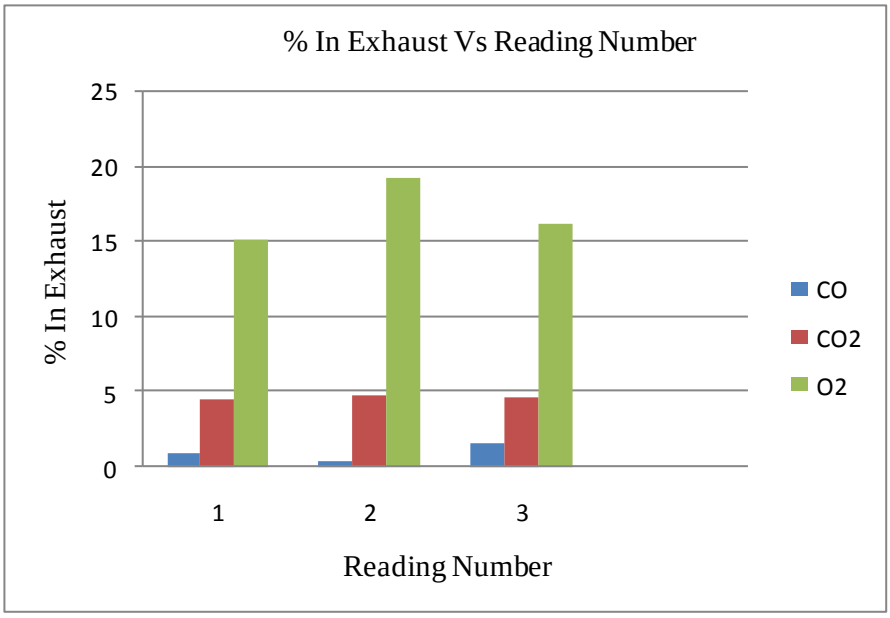
2.2) With Ethanol Blending (Petrol + Ethanol 15%)

Sr. No.	RPM	CO %	HC (PPM)	CO2 %	O2 %
1	8445	0.92	1230	4.5	15.11
2	7756	0.38	1059	4.8	19.23
3	7265	1.58	939	4.6	16.23

Table 2.2 (a): With Ethanol Blending (Petrol + Ethanol 15%)



Graph 2.2 (b): Without Ethanol Blending (Petrol)



Graph 2.2 (b): With Ethanol Blending (Petrol + Ethanol 15%)

V. CONCLUSION

The invention is related to the technical investigation where the effective utilization of fuel by internal combustion engine and reduction of ecologically harmful exhausts at their work is required. The offered design has a concrete purpose. The purpose of the invention is to increase the efficiency of fuel combustion of fuel in the S.I. with improvement of their ecological characteristics.

The end result is a more efficient and complete combustion, saving fuel up to 15% consistently.

1) Increases the output from 10-25% in S.I. engines.
2) Reduces heavy post-ignition.

3) Gives a cleaner, longer life to engine and oil burner.
4) Gradually cleans out the carbon build-up in cylinder.
5) Reduces harmful exhausts contribution to air pollution
6) CO and HC emissions are lowered when ethanol percentage in petrol increases

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