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# Comparative Performance Analysis of 4 Stroke Diesel Engines By Using Fuel Additive and Without Using Fuel Additive for Variable Loading Conditions

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**Abstract:** Rapid growth of automobile industry worldwide increases the fuel demand fuel used in the automobile is in its pure form which may reduce the performance of vehicle if the fuel additives like additive STP200559J is used in diesel engine increases the performance of the diesel engine. The results critically examines the performance standards i.e. Brake Power, Brake Specific Fuel Consumption, Brake Thermal Efficiency, Smoke emission and Exhaust gas Temp.. The results are calculated for fuel with and without using the fuel additive to check the effect on performance and emission standards.

**Keywords:** - Brake Power, Brake Specific fuel consumption, Brake Thermal Efficiency, Smoke emission and Exhaust gas Temp.

## I. INTRODUCTION

Many energy fuels are being investigated as potential substitutes for the current high-pollutant diesel fuel derived from diminishing commercial sources. Diesel used in the diesel engine is in the form of mixture with lead which reduces the performance of the engine the current study focus on the performance evaluation of diesel engine by using diesel fuel with and without fuel additive the comparative analysis shows the result whether additive gives better performance or not. The special additive STP200559J is used for diesel engine for variable loading conditions.

### A. Fuel Additive

Fuel additives are the chemical that are used to improve the performance of the engine it is added in fuel in a specific volume. Apart from the above quality it also help to reduce the corrosion effect, it also help to clean the injector and improves the cetane number. A fuel additive is eco-friendly and reduces the smoke emission and exhaust gaseous. STP200559J is a multifunctional diesel fuel additive with an outstanding keep-clean and clean-up formula. It is added in a fuel tank in a proper proportion and designed to improve the performance and emission of engine and also works as anti-corrosion and also works as injector cleaner. It is recommended for every diesel engine.

## II. EXPERIMENTAL SETUP

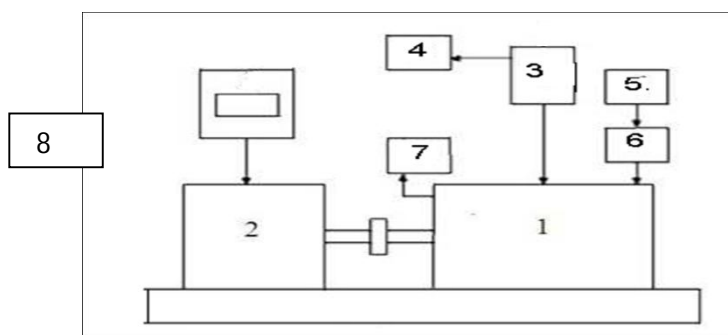


Fig. Experimental Setup

1. Diesel engine
2. Rope brake dynamometer
3. Air box
4. U-tube manometer
5. Fuel tank
6. Fuel measurement flask
7. Exhaust gas smoke meter
8. Dynamometer reading

Fig. Engin test

### III. ENGINE SPECIFICATIONS

Cylinders	01
Strokes	04
Fuel	Diesel
Power	5 hp @ 1500rpm
Cylinder bore & Stroke	87.5 & 110 mm
Compression Ratio	17.5:1
Dynamometer	Rope brake
Cooling	Water cooled

TABLE1: EXPERIMENTAL DATA TABLE FOR DIESEL WITH USING ADDITIVE (STP200559J)

Sr. no	W (Kg)	Time required for 10 ml fuel consumption in (sec)	Mf (kg/s)	B.P (kw)	$\eta_b$	Exhaust gas Temp. ( $^{\circ}$ C)	Smoke (%)	BSFC (kg/ kw hr)
1	0	108	0.000077	0.000	0.00	79	60	0
2	2	85	0.000098	0.539	12.99	95	58	0.652
3	5	75	0.000111	1.348	28.65	115	57	0.296
4	7	68	0.000122	1.887	36.37	126	61	0.233
5	10	54	0.000154	2.695	41.26	130	65	0.205

Table No.2: Experimental Data Table For Diesel Without Using Additive

Sr. no	W (Kg)	Time required for 10 ml fuel consumption in (sec)	Mf (kg/s)	B.P (kw)	$\eta_b$	Exhaust gas Temp. ( $^{\circ}$ C)	Smoke (%)	BSFC (kg/kw hr)
1	0	107	0.000078	0.000	0.00	80	62	0
2	2	84	0.000099	0.539	12.84	96	60	0.660
3	5	74	0.000112	1.348	28.27	116	59	0.300
4	7	67	0.000124	1.887	35.84	128	63	0.236
5	10	53	0.000157	2.695	40.50	131	67	0.209



#### IV. CONCLUSION

- A. Break Thermal efficiency for with additive STP200559J is increasing for variable loads
- B. Brake specific fuel consumption is lower with additive STP200559J as compared to fuel without additive for higher loading conditions
- C. Smoke emission level is low for additive STP200559J and it is slightly higher for without using additive.
- D. The exhaust gas temperature is lower down with using additive STP200559J and it is slightly higher without using additive. On the above whole, it is concluded that additive STP200559J gives optimum performance as compared to fuel without using additive. Thus the composition using additive STP200559J improves the performance of the engine.

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