

Design and Fabrication of Electrostatic Filter on a Muffler

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Abstract- In the recent study the capital of India is facing the greatest environmental problems. The air quality index of Delhi is very much greater than the air quality index of other major cities. The main cause that contributes to pollution is automobile exhaust gases. To reduce this exhaust an attempt is made to filter the flue gas from the exhaust through electric filter. In this work a filter is designed to reduce the emissions mainly Carbon Monoxide (CO), Unburned Hydro carbon (UBHC). The setup is tested with 70 cc engine and found that the emission levels are reduced to considerable amount.

Index Terms- Electric Precipitator, Carbon Monoxide (CO), Unburned Hydrocarbon (UBHC), High Negative and Positive voltage.

1. INTRODUCTION

It is difficult to state that our condition globe is encompassed the air pollution. Proclamation said that each person individual inhales around 2300 a day, breathing in about 17 to 24kg of air day by day. Characteristic contaminations incorporate tidy, dust, salt particles, smoke from woodland flames, and gases from natural waste. Most pollution caused by human enacts is specifically or by implication the after effect of burning of powers in heaters or engine. Contaminated air causes physical sick impacts choose unfortunate tasteful and physiological issues. The accessible fuel assets and the exhibit innovative improvement, petroleum fuel is clearly crucial.

When all is said in done, the utilization of fuel is an record for discovering the monetary quality of any nation. The main pollutants contribute via automobiles are carbon monoxide (CO), unburned hydrocarbons, oxides of nitrogen (NO_x) and lead. With a specific end goal to evade this sort of gases we made an electrostatic filter. Electrostatic filter is fitted to the exhaust pipe of the engine. The emanation can be controlled by utilizing the actuated electrostatics. The gas particles are charged utilizing high negative voltage supply. After that point they

are gone through high positive voltage. The particles are pulled in and afterward evacuated. This facilitate that there is no need of catalytic convertor. At the point when speeds of up to 9.1 ms⁻¹ were presented, the current-thickness distribution was not altogether adjusted. It can presumed that the particle flow isn't impacted by the essential flow in the precipitator [1]. By utilizing advancement of gathering effectiveness and statement consistency, consequences of test examinations propose utilizing lab-created NaCl airborne at a flow rate of 55 cc/min and ESP crown voltage of 6.4 kV, net accumulation efficiencies of 76– 94% for particles in the 30– 400nm territory were estimated by the FMPS, the efficiencies are around 88% [2]. Utilizing a similar vaporized, net testimony/accumulation efficiencies were dictated by molecule depends on SEM pictures and contrasted and estimated net efficiencies for a progression of consecutive tests utilizing crown voltages in the scope of 5.6– 6.8 kV [3]. The estimations of versatile modulus of glass and carbon fibre are equivalent to those given by the blend manage up to the point of introductory break of the carbon fiber segment [4]. The glass fiber-solid interface is corrupted by an expansion in temperature inside the range 20– 120 Celsius. The interfacial bond quality increments with time at room temperature for the frameworks under test and over the eras examined in this work [5].

II. IGNITION COIL

Ignition coil is encompassed by two coils of copper wire. Not at all like a power transformer, a start coil has an open magnetic circuit the iron center does not frame a shut circle around the windings. The vitality that is put away in the magnetic field of the center is the vitality that is exchanged to the start plug.

The primary winding has generally few turns of substantial wire. The secondary twisting comprises of thousands of turns of littler wire, protected from the high voltage by polish on the wires and layers of

oiled paper protection. The coil is normally embedded into a metal can or plastic case with protected terminals for the high voltage and low voltage associations. At the point when the contact breaker closes, it enables current from the battery to course through the primary twisting of the start coil. The current does not stream in a split second in view of the inductance of the coil. Current streaming in the coil creates a magnetic field in the center and noticeable all around encompassing the center.

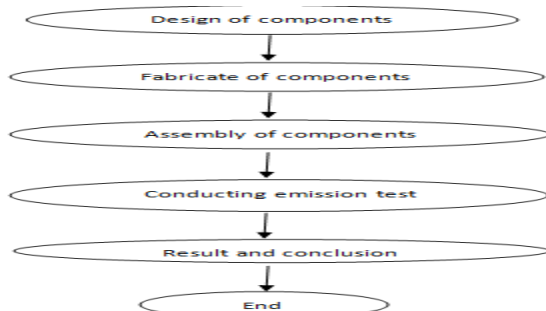
III. DC BOOSTER

It is a change mode DC to DC converter in which the yield voltage is more prominent than the information voltage. It is additionally called as venture up converter. The name venture up converter originates from the way that comparable to advance up transformer the info voltage is ventured up to a level more noteworthy than the information voltage. By law of protection of vitality the information control must be equivalent to yield control

IV. OBJECTIVE

Presently a days, transportation and mechanical regions are continues expanding and alongside them different pollutions are additionally expanding. It influences the earth of world seriously. The principle supporter in this pollution is automobiles i.e. harmless gases for expulsion of this substance or on the other hand to change over them in harmless gases, different methods are created by a few nations yet they are sweeping what's more, in creating nation like India, we require chirp and powerful system. An electrostatic filter is one of them. Henceforth it is utilized to lessen the contaminations and commotion of discharge from engine.

V.METHODOLOGY



VI. WORKING PRINCIPLE



Fig.-6.1 Electrostatic Filter

When the gas particles from the exhaust of the muffler passes through the electrostatic filter these particles get charged by the electrostatic. The charging voltage is around 4 kV, which is step-up using the small scale voltage to high voltage by the means of principle of transformer. These particles retain the high positive charge around them. This charged particle pass through the neutral surface area where the particles get attracted to the plate attached there. The particles attracts in the plate till it loses its charges. The particles are prevented from escaping to the environment. Therefore preventing the dust and soot pollution in the environment from the environment.

VII. DESIGN

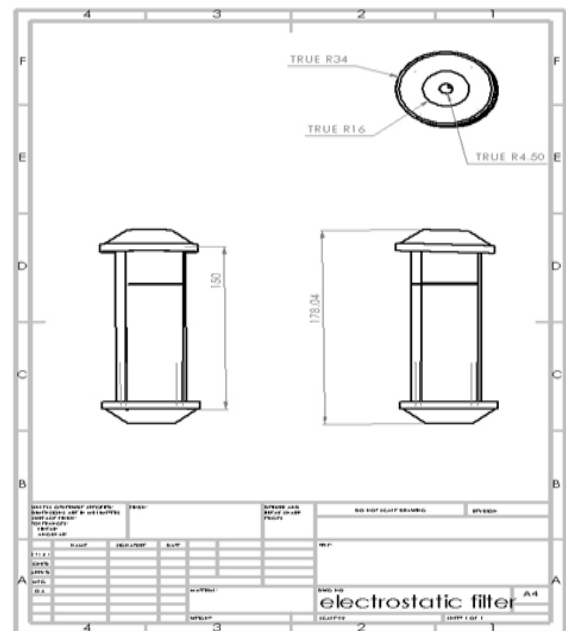


Fig.-7.1 Electrostatic Filter Design

VIII. EXPERIMENT SETUP

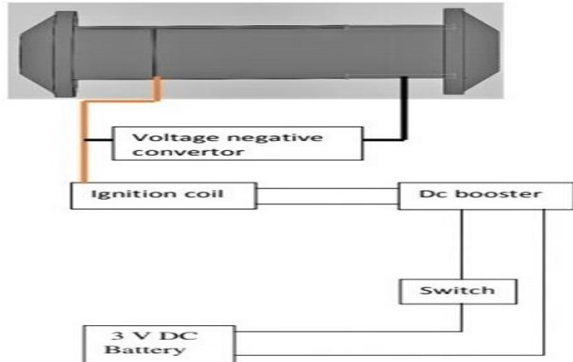


Fig.-8.1 Experiment Setup

IX. EMISSION ANALYSIS TEST



Fig.-9.1 Testing result with filter

The above figure shows the final view and assembled view of electrostatic filter. This electrostatic filter is made into emission test that is must compare to the conventional silencer

TESTING WITHOUT FILTER

PARAMETER	Regulation Limit(%)	Actual Reading
CO (%by Vol.)	3.5	01.156 %
HC (PPM)	6000	01062 PPM
CO ₂ (%by Vol.)		12.18
O ₂ (%by Vol.)		00.23

Fig.-9.2 Testing result without filter

TESTING WITH FILTER

PARAMETER	Regulation Limit(%)	Actual Reading
CO (%by Vol.)	3.5	00.686 %
HC (PPM)	6000	00682 PPM
CO ₂ (%by Vol.)		11.18
O ₂ (%by Vol.)		00.23

Fig.-9.3 Testing result with filter

X. RESULT

The results which are obtained from the testing analysis that the level of carbon monoxide level is diminished by 43.5 rate, hydrocarbon level is diminished by 38.02 rate and carbon dioxide level is diminished by 8.21 rate. From the previously mentioned outcomes it is discovered that the general pollution level is diminished by 29.91 rate.

XI. CONCLUSION

By using electrostatic filter it effectively eliminates the pollutants in the exhaust gases where fuel consumption is same that of conventional muffler. The pollution emission is less to our environment. Therefore causing less effect to environment.

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