

DECARBONISATION OF INTERNAL COMBUSTION ENGINE

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ABSTARCT: Automobiles became quite common in human life. After certain period of time, every automobile need to undergo servicing to avoid problems like engine failure, etc. Similarly Decarbonisation is one of the servicing process used to clean carbon deposits inside the combustion chamber (which forms during combustion process). These carbon deposits formed during combustion process may adverse effect such that engine performance gets slow down which may causes engine life degradation. Decarbonisation can be done mostly in two ways either mechanically or by using chemical solvents. In this project our work focusses on the study of how decarbonisation can be done without dismantling the engine. We tested and compared the vehicle parameters before and after the decarbonisation process.

KEYWORDS:

Carbonisation, Decarbonisation, Energizer, Hydroxy gas (HHO).

1. INTRODUCTION:

In internal combustion engine, heat generation takes place by combustion of fuel (petrol/diesel). As the fuel burns completely, the engine work will be more efficient. This combustion process takes place in combustion chamber of an I. C engine (either two stroke engine or four stroke engine). I. C engine i.e., internal combustion engine converts this fuel energy into mechanical energy which is required to run the automobiles.

In this project, our work was carried out on hero glamour bike.

1.1. Engine specifications:

Engine Type	Air cooled 4 stroke
Displacement	125 cc
Max Torque	10.4 Nm @ 6000 rpm
No. of Cylinders	1
Cooling System	Air Cooled
Valve Per Cylinder	2
Starting	Kick and Self Start
Fuel Supply	Fuel Injection
Clutch	Wet Multi-plate
Gear Box	5 Speed
Bore	52.4 mm
Stroke	57.8 mm
Compression Ratio	9.9:1
Emission Type	bs6-2.

1.2. Carbonisation:

When automobile covers a distance over 30,000 km to 70,000km, a layer of carbon deposit forms inside the cylinder (combustion chamber). Formation of this carbon layer is called carbonisation. Carbonisation of an I. C causes some effects such as

- Reduction of work efficiency.
- High fuel consumption
- Engine life degradation etc.

This carbonisation can be determined by the following factors. They are:

- Reduce in mileage
- Black smoke
- Sound of the engine while running

1.3. Decarbonisation:

Removal of carbon deposits that are left over after combustion from the combustion chamber is known as decarbonisation. It is of two types

- Physical/mechanical
- Chemical

Physical decarbonisation can be done by dismantling the engine, whereas chemical decarbonisation can be done with very less effort compared to physical.

2. LITERATURE SURVEY:

Authors	Outcomes	Drawbacks
Roger cracknell	Decarbonisation of mobility	Hazards due to risk of thermal runaway and combustible gas release
George mallouppas	Decarbonisation in shipping industry	Only 3% contribution to greenhouse gas(GHG) emissions

3. PROBLEM STATEMENT

3.1. Protecting life span of an engine Incomplete combustion causes decrease in efficiency of the engine. So this process helps in maintaining engine at better condition.

3.2. Environmental conditions Decarbonisation helps in reducing the carbon and other pollutants percentage in exhaust gases, which causes pollution.

3.3. Better economical condition:

Compared to mechanical decarbonisation Chemical decarbonisation requires less cost, time and effort.

4. MOTIVATION AND OBJECTIVES

Motivation

Decarbonisation in internal combustion engine mainly aims to decrease the greenhouse gas emissions and conflict climate change, by lowering carbon dioxide (CO₂) gases from vehicles. we can control the impacts of global warming and reduce air pollution, which leads to healthier environment.

Objectives

- To increase efficiency of an old engine.
- To decrease the unburned carbon content in internal combustion engine.
- To maintain optimal engine function

5. METHODOLOGY

Starting the project based on collected literature



Identifying the required components of decarbonisation such as Energizer, syringe, Hydroxy gas machine etc.



Performing decarbonisation process



Performing inspection and testing the Internal combustion engine



Comparing the results before and after Decarbonisation process

6. COMPONENTS AND MATERIALS

1. Energizer:

In this project we used acetone as energizer. This removes carbon deposit layer by breaking them into small pieces.

2. Syringe:

Syringe is used to inject the energizer into the fuel tank of an internal combustion engine. Its max capacity is 60ml. For bikes - 15ml to 20ml

For cars - 30ml to 60ml

Based on cc of an engine and distance covered by the automobile.



3. Hydroxy gas machine: This machine discharges hydroxy gas in a certain flow rate based on the size (CC) of the engine through a hose/pipe into the air inlet valve of an internal combustion engine.



7. WORKING PROCEDURE

- Checking whether the engine is weak or not. By observing the exhaust gas properties like colour (black/white) and engine sound.

(To make this process fuel should be maintained at 20% of its capacity)

- Injecting Energizer into the fuel tank using 60ml capacity syringe.
- Put the hose of the hydroxy gas machine into the air inlet valve of internal combustion engine of an automobile.
- Adjust the parameters/controls of the hydroxyl gas producing machine based on the requirements.
- Switch on the bike/car engine and then accelerate it for 15 to 20 sec for every 2 min interval of time.
- This process is carried out for 15 to 30 min based on type of engine, cc of an engine, distance travelled and other parameters.

(After completing this process, fuel tank should be emptied before it undergoes refilling)

8. MERITS & DEMERITS

Merits:

- Pickup speed increases
- Mileage increases
- Black smoke reduces
- Requires less money, time and effort compared to mechanical decarbonisation.

Demerits:

- Some chemical agents used for decarbonisation can be harmful to the environment.
- Some chemical solvents may corrode the engine if they are not used properly.

9.APPLICATIONS This process is used for all types of automobiles (internal combustion engines) such as cars, bikes, scooters, etc.

FUTURE SCOPE

This process may become button operated and also fully automated such that carbon deposit can be removed time to time. New procedures and methods can be discovered to remove the carbon deposit layer.

10.CONCLUSION

Hence, our intension is to clean or remove the unwanted wastes like carbon deposits through an effective technique i.e., chemical decarbonisation which removes the carbon deposits internally and effectively by cleaning agents or chemical solvents. It also leads to improved performance and fuel efficiency of the internal combustion engine.

11. REFERENCES

1.Wheeler G. Lovell and Thomas A. Boyd, United State Patent Office, "Method and Means for Removing Carbon Deposits", Application filed August 28, 1929, Serial no. 389,091

2.George Hofele, St. Louis, United State Patent Office, "Apparatus for Removing Carbon and Other Deposits from Internal Combustion Engines", original Application December 2, 1938, Serial no. 243,571

3. George Calvert, of Stoke Newington, London, England, United State Patent Office, "Combustion Engine Cleaner", application filed march 7, 1911, Serial no. 612,786.

4. Staffan lundgren, hindas, Edward Jobson, Romelanda, United State Patent Office, "Agreement for Analysis of Exhaust Gases", Filed February 21, 1996, Application no. 08/894,391

5. Raymond F. Baddour, Belmont, Mass, United State Patent Office, "Method and Apparatus for Trapping and Incinerating Particulate Matter found in Diesel Engine Exhaust", Filed June 29, 1990, Application no. 546,403