An Investigation Reduction Technique For Emissions Like HC , CO, Particulate Matter And Reduction Of Exhaust Silencer Temperature Etc., For 2 Stroke IC Engines

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Abstract-*Two stroke Automobile emissions reduction is the study of reducing the automobile emissions produced by automobile vehicles, especially in 2 stroke internal combustion engines. At present day in all over world all nation in the globe suffering from the effects caused by air pollution of automobile emissions may be from 2 stroke engines or either 4 stroke diesel or any engines, petrol or may be gasoline engines or any other emission generating engines. In the world every automobile conventional automobile engines produces major and minor emissions mainly Hydrocarbon(HC), Carbon monoxide(CO), Nitrogen oxides(NOX),Sulfur oxides(SOx), Particulate matter, Volatile organic compounds etc.*

There are many techniques to reduce harmful emissions from silencer and exhaust pipe. In emission control the catalytic converter is used to reduce the emission control for automobile. Hence we have taken an exhaust pipe designed with baffle pipe inside exhaust pipe with turbo whistle and as been coated with aluminium and sodium silicate and a porous black solid are used inside coating of silencer pipe.The main aim of the project is to reduce emission and control technique for 2 stoke engine and to get idea about emission reduction technique for different automobile engines. There is no need of cataltytic converter or other methods by using this method. It is cheaper compared to other methods.

Keywords-kp4all, aluminium silicate, silencer, emission control, automobile emissions. Sodium silicate.

I. INTRODUCTION

Air pollution of automobile is one of the important Projects in automobile engineering emission control technique as it affects the human life, animals and the ecosystem of earth. 2 stoke and 4 strokes even all automobile conventional engines. The HC,CO, NOX, SOX etc., dangerous pollutants which causes human,animals and plants. Larger emission causes the smog in surrounding. Any automobile pollutants substance that is introduced into the surrounding atmosphere that has damaging surrounding. For example of a human activity that causes air pollutionis heating and cooling at factories and workplace of thermal power plants The emissions generated by an individual vehicle are generally less, compared to many other sources of pollutant. However, emissions from thousands of latest vehicles in market enters every day. To Reduce emission use city bus ,metro buses & metro trains in metropolitan cities because of using this facility drastically we reduce emissions in cities and reduce traffic jam and emission control in traffic. Vehicle keep in idle which increases more emission if vehicle stops more than 1 minute off engine it reduces emission. Conventional automobile engines are facing problem in combustion chamber as they produce higher quantity of unburned hydrocarbons (HC), carbon monoxide (CO) emissions ,oxides of nitrogen(NOx) and emissions like particular matter etc., The catalytic converter is costlier compare to developed fabricated exhaust pipe coated with aluminium silicate, sodium silicate, and turbo whistle is used to pressure the exhaust pollutants outside. The Turbo whistle is used inside centre of fabricated silencer pipe. Inside the pipe with refractory activated charcoal with sodium silicate and turbo whistle which reduces hydrocarbon and carbon monoxide and emissions compare to conventional silencer. Inside the silencer pipe baffle fitted so that exhaust emissions exposed to baffle and turbo whistle coated with refractory coated in inner surface.

Refractory(aluminium silicate)

Turbo whistle or blow off valve

Activated charcoal

II. IDENTIFY, RESEARCH AND COLLECT IDEA

Heavy Duty Super XL Specifications & Features

Engine & transmission

Displacement	69.90cc	Fuel Type	Petrol
Cylinders	1	Ignition	Fly Wheel Magneto 12v,50w
Max Power	3.50 bhp @ 5,000 rpm	Spark Plugs	1 Per Cylinder
Maximum Torque	5 Nm @ 3,750 rpm	Cooling System	Air Cooled
Bore	46 mm	Gearbox Type	Automatic
Stroke	42 mm	No. of Gears	--
Valves Per Cylinder	2	Transmission Type	Chain Drive
Fuel Delivery System	Carburetor	Clutch	Centrifugal Wet Type

Brakes, wheels & suspension

Brake Type	**Drum**	Front Tyre	**2.5 x 16**
Front Disc	**No**	Rear Tyre	**2.5 x 16**
Front Disc/Drum Size	**80 mm**	Tubeless Tyres	**No**
Rear Disc	**No**	Radial Tyres	**No**
Rear Disc/Drum Size	**110 mm**	Alloy Wheels	**No**
Calliper Type	**--**	Front Suspension	**Telescopic spring type**
Wheel Size	**16 inches**	Rear Suspension	**Swing arm with hydrau**

Dimensions & chassis

Kerb Weight	**66 kg**	Wheelbase	**1,222 mm**
Overall Length	**2,020 mm**	Ground Clearance	**155 mm**
Overall Width	**750 mm**	Seat Height	**770 mm**
Overall Height	**1,110 mm**	Chassis Type	**Underbone Type**

Fuel efficiency & performance

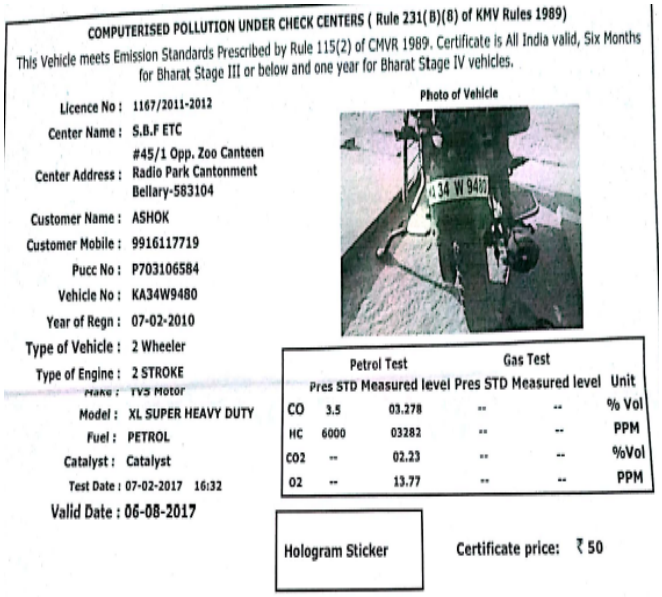
Fuel Tank Capacity	**3 litres**
Reserve Fuel Capacity	**1 litres**
Fuel Efficiency Overall	**66 kmpl**
Fuel Efficiency Range	**210 km**
Top Speed	**50 kmph**

1) **Features**

Speedometer	**Analogue**	Digital Fuel Guage	**No**
Fuel Guage	**Yes**	Tripmeter	**No**
Tachometer Type	**--**	Electric Start	**No**
Tachometer	**No**	Shift Light	**No**
Stand Alarm	**No**	Antilock Braking System	**No**
Stepped Seat	**Yes**	Killswitch	**No**
No. of Tripmeters	**--**	Clock	**No**
Tripmeter Type	**--**	Electric System	**12V DC**
Low Fuel Indicator	**Yes**	Battery	**12V**
Low Oil Indicator	**No**	Headlight Type	**Multi Reflector Head Lamp**
Low Battery Indicator	**No**	Headlight Bulb Type	**12V-35/35W**
Pillion Backrest	**No**	Brake/Tail Light	**12V-5W**
Pillion Grabrail	**Yes**	Turn Signal	**12V-5W**
Pillion Seat	**Yes**	Pass Light	**No**
Pillion Footrest	**Yes**		

The experiement is carried out for 2 stroke TVS XL super duty engine as given above specifications and feautures. Replacing the original TVS XL heavy duty silencer with modified fabricated silencer pipe. The new silencer made with steel and welded in workshop. The baffle and the turbo whistle is fitted inside silencer. The inner surface of silencer pipe, baffle and turbo sound whistle is coated with the refractory contains aluminium silicate,sodium silicate and activated charcoal.

Aluminium silicate and sodium silicate with activated carbon mixed with ratio 3:1 by weight in weighting machine. Before starting work safety precaution and care should be taken starting work. In clean place in workshop mixed refractory is coated because of small particals and foreign particles chances of enter inside coating. The exhaust pipe internal side coated refractory with brush of modified silencer pipe, baffle coated with 3 mm and turbo sound whistle with 1 mm. After completing inner coating the hot air is passed through the modified silencer which removes extra moisture and small foreign particles. In next step fixing the modified silencer to the two stroke TVS XL heavy duty vehicle for emission tests and the pressure blowing out of your exhaust will make sounds like a turbo vehicle with the turbo system or blow off valve. In next step the computerized pollution with old and modified silencer is fixed to old silencer and emission test is taken in computerized pollution testing centre. The following results found in computerized testing after emission tests.



COMPUTERISED POLLUTION UNDER CHECK CENTERS (Rule 231(B)(8) of KMV Rules 1989)

This Vehicle meets Emission Standards Prescribed by Rule 115(2) of CMVR 1989. Certificate is All India valid, Six Months for Bharat Stage III or below and one year for Bharat Stage IV vehicles.

Licence No : 1167/2011-2012
Center Name : S.B.F ETC
Center Address : #45/1 Opp. Zoo Canteen Radio Park Cantonment Bellary-583104
Customer Name : ASHOK
Customer Mobile : 9916117719
Pucc No : P703106584
Vehicle No : KA34W9480
Year of Regn : 07-02-2010
Type of Vehicle : 2 Wheeler
Type of Engine : 2 STROKE
Make : TVS Motor
Model : XL SUPER HEAVY DUTY
Fuel : PETROL
Catalyst : Catalyst
Test Date : 07-02-2017 16:32
Valid Date : 06-08-2017

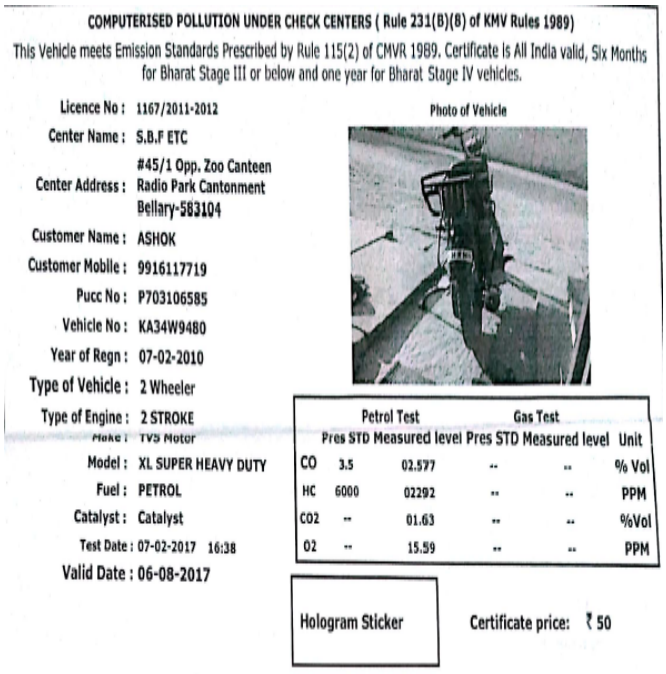
Photo of Vehicle

	Petrol Test		Gas Test		
	Pres STD	Measured level	Pres STD	Measured level	Unit
CO	3.5	03.278	--	--	% Vol
HC	6000	03282	--	--	PPM
CO2	--	02.23	--	--	%Vol
O2	--	13.77	--	--	PPM

Hologram Sticker

Certificate price: ₹ 50

2.1 Old silencer pipe without refractory



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Model : XL SUPER HEAVY DUTY
Fuel : PETROL
Catalyst : Catalyst
Test Date : 07-02-2017 16:38
Valid Date : 06-08-2017

Photo of Vehicle

	Petrol Test		Gas Test		
	Pres STD	Measured level	Pres STD	Measured level	Unit
CO	3.5	02.577	--	--	% Vol
HC	6000	02292	--	--	PPM
CO2	--	01.63	--	--	%Vol
O2	--	15.59	--	--	PPM

Hologram Sticker

Certificate price: ₹ 50

2.2 Fabricated silencer pipe coated with aluminium silicate, sodium silicate ,charcoal and turbo sound whistle with 3 mm innernal coating reduces emissions

III. STUDIES AND FINDINGS

Objectives of present study and findind:

A. Bits and Pieces together

The main study and finding of this fabricated modified silencer pipe is reduces HC, CO,CO2 and other emissions.

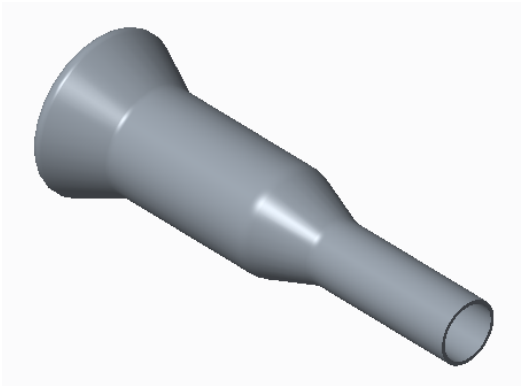
To measure emissions by conventional and modified silencer pipe.

By using this modified technique with turbo sound whistle which slightly observes heat inside it slightly reduces exhaust outlet temperature.

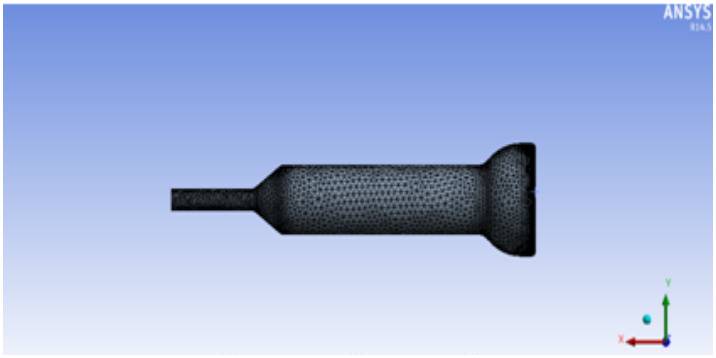
In computerized emission test for 2 stroke petrol engine to find difference.

B. Use of Simulation software

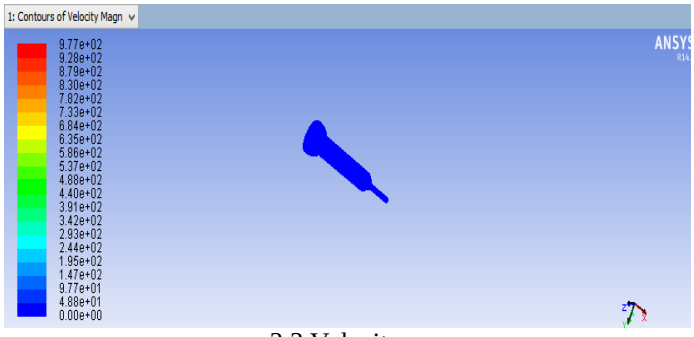
In this used simulation software is ANSYS for CFD analysis and for modelling PTC CREO, formerly known as Pro/ENGINEER, is 3D modeling software used in mechanical engineering, design, automobile manufacturing, and in CAD drafting service firm many more It was one of the first 3D CAD modeling applications that used a rule-based parametric system. Using parameters, dimensions and features to capture the behavior of the product,can optimize the development product as well as the design itself. PTC CREO says it can offer a more efficient design experience than other modeling software because of its unique features including the integration of parametric and direct modeling in one platform. The complete suite of applications spans the spectrum of product development, giving designers options to use in each step of the process. The software also has a more user friendly interface that provides a better experience for designers.



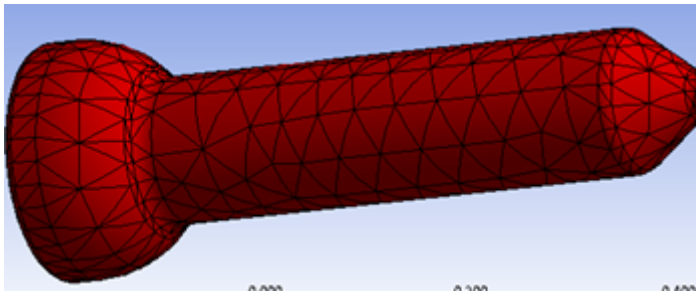
3.1 Creo modeling



3.2 Meshing of modified silencer



3.3 Velocity



3.4 Thermal analysis

IV. GET PEER REVIEWED

Tables

	Prescribed level CO (%)	Measured standard CO (%)	Prescribed level HC (PPM)	Measured standard HC (PPM)
Conventional silencer pipe	3.5	3.278	6000	3282
Modified refractory silencer pipe	3.5	2.577	6000	2292

V. IMPROVEMENT AS PER REVIEWER COMMENTS ADVANTAGES OF CREO PARAMETRIC SOFTWARE

1. Optimized for model-based enterprises it takes less time
2. Increased engineer productivity and user friendly
3. Better enabled concept design while modeling
4. Increased engineering capabilities and quick
5. Increased manufacturing capabilities of user and designer
6. Better simulation in the CREO compare to others
7. Design capabilities for additive manufacturing is easy

CREO parametric modules:

1) Sketcher of given model
2) Part modeling
3) Assembly of given component
4) Drafting

VI. CONCLUSION

After completing the experiment it observed that the emissions of 2 stoke TVS XL heavy duty vehicle of emissions like CO, HC and emissions reduced and the fabricated new coated with aluminium silicate, sodium silicate, turbo sound whistle which slightly reduces temperature and harmful gases from exhaust pipe. Compare conventional 2 stroke silencer and modified silencer reduces emissions and temperature which controls air pollution of 2 stoke engine.

REFERENCES

[1] https://www.bikewale.com/tvs-bikes/heavydutysuperxl/ for specification and features for 2 stroke XL super heavy duty

[2] www.kp4all.blogspot.com

[3] www.facebook.com/india.automobile

[4] FABRICATION OF EMISSION CONTROL SILENCER FOR 2□STROKE PETROL ENGINE USING REFRACTORY AND ACTIVATED CARBON LAYER author 1PAVAN KUMAR, 2 DR. RAJAGOPAL, 3 DR. HIREGOUDAR YERRANA GOWDA, 4 RAGHURAM G http://www.ijset.in/wp-content/uploads/2015/09/10.2348.ijset09151157.pdf

[5] An investigation to reduce emission from IC engines authors PK Pavan kumar, Kalburgi bharath www.iosrjournals.org

[6] https://en.wikipedia.org/wiki/Vehicle_emissions_control

[7] https://en.wikipedia.org/wiki/Aluminium_silicate