

## Emission Norms using Bharat Stage VI for Two Wheeler

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**Abstract**—Emission Standard of India was conveyed in 1991 has reached today to directly switch to BS VI from BS IV norms. This decision to bound fuel standards has brought about to disorder oil and auto Industry. What are the challenged faced by these organizations for this evolution based on technical understanding is conversed in this paper. For S.I engines machineries that are expected to be commercialized that will help automobiles to fulfill the BS VI norms are illuminated. Machinery up gradation, its validation and adjustment of this technology by customers are some of the major issues faced by the auto sector. Reduction of time line, collection of proper technology for decontaminating, refurbishing of the current units and parallelly spreading of two forms of oil are the major encounters faced by the oil refineries.

**Keywords**-Emission Norm Forms, Roll over valve

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### I. INTRODUCTION

The Indian Government is announcing Bharat Stage VI (BS-VI) emissions standards (correspondent to Euro VI standards) from 2020, absolutely by-passing Stage V standards. In place of commercial vehicles by means of diesel engines, these ideologies will moderate the NO<sub>x</sub> productions via 88% and Particulate Matter (PM) productions via 66% from existing BS IV standards. [4]

Table 1 shows tailpipe radiations and test cycles for BS IV and BS VI emissions standards.

The primary of Indian emission principles be situated idle emission limits which come to be operative on 1989. These sluggish emission philosophies were quickly swapped by mass emission parameters for individually, gasoline (1991) and diesel (1992) vehicles, which be located progressively squeezed for the period of the 1990s. In the year 2000, India is in the advancement to adopting European emission principle and petroleum emission for four-wheeled and strong vehicles. Specific standards regulations for emission of India are still useful to two and three wheeled vehicles.

#### A. Existing Emission Norms for Two-Stroke Engines

Due to these three reasons, two-stroke engines are so extremely emission intensive:

- i) The engine releases huge amounts of hydrocarbons counting Benzene and other impurities.
- ii) It functions on a combination of oil and fuel relatively than fuel alone, as with four-stroke engine.
- iii) A huge amount of fuel is emitted un-burnt.[5]

Standard	Test Cycles	C	H	NO	P
		O	C	x	M
		g/kWh			
BS IV	European Steady – state Cycle (ESC)	1.5	0.46	3.50	0.02
	European Transient Cycle (ETC)	4.0	0.55	3.50	0.03
BS VI	World Harmonized Steady – State Cycle (WHSC)	1.5	0.13	0.40	0.01
	World Harmonized Transient Cycle (WHTC)	4.0	0.16	0.46	0.01

Table 1 Tailpipe emissions standards for India

#### B. Bharat Stage VI Principles

Bharat Stage VI principles for two and three wheeled vehicles were suggested in February 2016 (avoiding the BS V stage). The recommended limits, Table 1.2, put on new model two wheeled vehicles and all models of three wheeled vehicles. These offered standards bring into line through Euro V limits for these vehicles.

If these emissions are not controlled then definitely it will affect to the human life very dangerously. The AajTak news channel recently surveyed that the people living in Patna are badly suffering from respiratory disorders and they organized a medical camp to check the fitness of the neighbouring publics, they found that 73.5% of the publics has spoiled lungs due to the breathing of the hydrocarbons, NO<sub>x</sub>, PM, and Co.

#### C. Feature of BS VI Standards

- Globally synchronized motorcycle trial for two wheelers and Indian driving cycle for three wheelers being used.[6]
- Isolated standards for NO<sub>x</sub> and HC.

- Evaporative norms limit to 1.5 g/test.
- All mass norms boundaries are comparable to EURO-5 limits for L-category automobiles.
- Isolated criteria aimed at two wheelers with engine less than 50cc.

## II. LITERATURE SURVEY

In the last five decades most of the parts of the world, the effect of exhaust emissions and the

legislations limiting the pollutants are well established. Worldwide experimental study on the vehicles with advanced technology both gasoline and diesel show reduction in PM mass but higher in particle number which are generally in the ultrafine series[7]. There is a need to evaluate emission control strategies based on the engine design and after-treatment devices both, for their effectiveness in the control of the small fraction of particulates as well as particle number emissions.

Date	Stage	Type	CO	HC	NMHC	NOx	PM
<b>2-Wheel Vehicles (new models only)</b>							
2020.04	BS VI	SI	1.0	0.10	0.068	0.06	0.0045*
		CI	0.50	0.10	0.068	0.09	0.0045
<b>3-Wheel Vehicles (all models)</b>							
2020.04	BS VI	SI	0.44	0.35	-	0.085	-
		CI	0.22	0.10	-	0.10	0.025

Table 2 Proposed BS VI emission standards for 2g/ km

### A. Parameters of Vehicular Pollution

Air pollution from vehicle is divided into primary and secondary pollution. Firstly pollution is released directly into the environment; then after pollution results from natural reactions between pollutants in the environment. The major pollutants from automobiles are mentioned below:-

**HYDROCARBONS (HC):-** These are containing with nitrogen oxides in the existence of sunlight to form base level ozone, a primary group in pollution. However it is useful in the higher atmosphere, at the base level, this gas infuriates the breathing system, affecting coughing, choking, and reduced lung capacity [1,2].

**CARBON MONOXIDE (CO):-** This odorless, dull, and toxic gas is measured by the burning of fossil oils such as gasoline and is released primarily from auto vehicle. When breathe in, CO blocks oxygen from the brain, heart, and other vital body part. Fetuses, new-born children, and people with chronic illnesses are especially at risk to the effects of CO.

**NITROGEN OXIDES (NOx):-**NOx is formed when nitrogen which is present in environment reacts to oxygen at the high temperature and pressure inside the engine. It is a mixture of NO, N2O, and NO2. NO2 is extremely reactive. It finishes resistance to breathing organism.

**PARTICULATE MATTER (PM):-** These particles of smoke black and metals give smoke its murky color. Good elements fewer than the one-tenth of the diameter of a human hair disembrace the most serious danger to human healthiness, as they can go in bottomless into lungs [3].

## III. METHODOLOGY

Over the last decade or so, various emission control technologies have been introduced into the motorcycle marketing response to adopted emission standards. Automotive industry is continuously researching and updating to adopt emission standards.

### A. Engine Combustion Controls

Over the last decade or so, various emission control technologies have been introduced into the motorcycle marketing response to adopted emission standards. The first methodology to decrease emissions from any engine focuses on elevating the burning process. Charges are an essential aspect in the application of two-stroke engines and therefore, the cost of enhancements must be considered against the cost of a four-stroke engine[8]. The noticeable focus for decreasing emissions from two-stroke engines essential consider reductions in scavenging lose. The approaches that have been considered, attempt to separate the air and fuel intake strategies by using air to accomplish scavenging. One such method integrates direct injection to introduce fuel directly into the combustion chamber once the exhaust port is closed. PM reductions can be achieved by not mixing lubricating oil with the fuel.

### B. Evaporative Controls

The target of evaporative emissions systems is to minimize or removes the discharge of vaporized HC into the environment. This structures ensure been used on vehicles since the 1960s in the form of PCV or encouraging crankcase ventilation valves. Evaporative emission regulator schemes on vehicle have increased in difficulty over the years but only fairly recently been applied to motorbikes.

Evaporative emissions control on motorbikes involves of carbon canisters associated to the fuel system to capture

and recycle HC vapours back to the intake of the engine to be combusted.

The carbon is in elevation surface area pelletized material that adsorbs fuel gases through loose chemical ties and ejections them in a well-ordered manner via a purge solenoid. Almost all gasoline tanks of motorbikes are metal and demonstrate no permeation[9]. A vented fuel cap serves to permit air to pass in as fuel is depleted while venting expanded vapours in the fuel tank into the carbon canister.



Fig-1 FI arrangement in 2 wheeler

In BS-VI, Evaporative Controls method is used to control the fuel evaporation. FI version fuel tank is implemented to reduce the air pollution. As in BS-IV, Carburetor type fuel tank was used to control the evaporation.

#### C. EFI vs. Carburetor

- EFI technology involves the air and gasoline mixture in the exact ratio before feeding it down to the main cylinder to power the motorbike. This function is commonly done by the carburetor but it suffers from certain limitations (inadaptable fixed settings), which the EFI will overcome.
- Data from various sensors like engine speed sensor, temperature sensor, voltage sensor, oxygen sensor etc. is sent to the electronic control unit (ECU).
- EFI will use that data and inject the appropriate air-fuel mixture (depending on the requirement) will be fed into the cylinder. This in turn will deliver optimum power and a cleaner exhaust.

#### D. Evaporative Controls Through Canister

In fuel tank, there is breathing hole for breathing purpose (taking air and releasing air). While breathing, some amount

fuel vapor also releases in atmosphere which causes air pollution. To control this there is addition of a Canister.

The function of Canister is to absorb fuel (liquid with mixture of air) and drained condensed liquid to purge valve. [10]. After purge valve a homogenous mixture of air & fuel depart into engine and it will burn. Very less amount of CO and HC will come with exhaust.

#### IV. CONCLUSION

This topic was basically selected to make you all aware where we stand despite of having some of talent and money. India is considered to be a country where primary industry is the largest markets, we are considered to be a country where we support the slogans "Go Green" meanwhile some of our public polluted our nation. Let us do our bit by making people aware about this issue and reduce the rate of deaths by applying this following measure. Even if 30% people start taking this issue seriously then the deaths caused by the pollution can reduce by 10% annually. We can go for HYBRID VEHICLES or vehicles which are running on alternating energy source, but in country like India to afford such vehicles is very difficult since some of the population is below poverty line and most of the population is middle class.

Through all these efforts people can ensure significant reduction in air pollution from automobiles. This will take notable improvement in air quality in highly populated towns as auto bikes are main source of air pollution in cities.

#### V. REFERENCES

- [1]. FLEXChip Signal Processor (MC68175/D), Motorola, 1996.
- [2]. PDCA12-70 data sheet, Opto Speed SA, Mezzovico, Switzerland.
- [3]. Shell M, 2002, IEEEtran homepage on CTAN. [Online]. Available: <http://www.ctan.org/techive/macros/latex/contrib/supported/IEEEtran/>
- [4]. [www.teambhp.com](http://www.teambhp.com)
- [5]. "India switches fully to Euro III and IV petrol and diesel" The Hindu. 24 September 2010
- [6]. "straight drive" BH Plan /Team BHP News/20th November 2009.
- [7]. United states Environmental protection agency (October 22, 1998) Mack trucks diesel engine settlement.
- [8]. "Functions of the central pollution control Board" central pollution control Board
- [9]. SoraceRE, Reinhardt VS, VaughnSA, High-speed digital-to-RF converter, U.S. Patent 5 668 842, Sept. 16, 1997.
- [10]. Coalition for Commercial Application of Superconductors Website, 2015, [Online]. Available: <http://www.cca.org/upconductivity/#image>