

Challenges to bring BS-VI engine to India

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Abstract: Now a day emission is the biggest problem in world. It mostly coming from automobiles because the usage of bikes, cars, buses, lorries, trucks, vans, etc...these are increasing day by day due to need of humans to travel several places, and transporting the products from industries to several areas with help of vehicles. So the usage of automobiles is rapidly increased in each and every country in the world. By using of more vehicles the environment is completely changing the atmosphere condition, due to emission. Basically emission is caused due to unburned hydrocarbons and it comes from exhaust of automobiles, the government of India takes more steps to control the emission and finally they stop the production of BS-III engine norms and start the BS-IV engine norms in India at 2017. But the government of India is planning to introduce BS-VI engine norms in the year of 2020, and they skipping the BS-V engine norms due to various issues. Challenge to every automobile industry in India to manufacture the BS-VI engine with correct norms and to control the emission.

Keywords: BS-VI norms, Emission Standards, Challenges to automakers, Control of emission.

I. INTRODUCTION

India is one of the most air polluting countries in the world because more than 30 cities in India highly polluting the emission and it carries the top 100 polluted cities in the world. The complete data is published by world health organization (WHO) in May 2016. The terms of enforcing and implementing the various emission norms in cities Delhi having vehicle contribution is 59% of carbon monoxide, 50% of hydrocarbon, and 18% of nitrous oxides carrying overall emission. The strong opinion of policy makers collaborate with Indian environmental groups to increase the standards of vehicle to implementing the all kind of vehicles in the India. In Indian country mostly BS-III engines are using in several areas and currently 13 cities only carrying the BS-IV norms. For implementing every norm industries are facing the quality and cost problems. BS-IV and BS-VI are commonly using to control the emission like NO_x, PM, HC.

Emission Standards for Light Duty Vehicles^{III}

| Petrol Vehicles | Unit | BS-IV Norms | | | BS-VI Norms | | |
|-----------------|-------|----------------|-------------|--------------|----------------|-------------|--------------|
| | | M & N1 Class I | N1 Class II | N1 Class III | M & N1 Class I | N1 Class II | N1 Class III |
| CO | g/ km | 0.50 | 0.63 | 0.74 | 0.50 | 0.63 | 0.74 |
| HC | g/ km | - | - | - | - | - | - |
| HC+NOx | g/ km | 0.30 | 0.39 | 0.46 | 0.17 | 0.195 | 0.215 |
| NOx | g/ km | 0.25 | 0.33 | 0.39 | 0.08 | 0.105 | 0.125 |
| PM | g/ km | 0.025 | 0.04 | 0.06 | 0.0045 | 0.0045 | 0.0045 |
| Diesel Vehicles | Unit | M & N1 Class I | N1 Class II | N1 Class III | M & N1 Class I | N1 Class II | N1 Class III |
| CO | g/ km | 1.00 | 1.81 | 2.27 | 1.00 | 1.81 | 2.27 |
| HC | g/ km | 0.10 | 0.13 | 0.16 | 0.10 | 0.13 | 0.16 |
| HC+NOx | g/ km | - | - | - | - | - | - |
| NOx | g/ km | 0.08 | 0.10 | 0.11 | 0.060 | 0.075 | 0.082 |
| PM | g/ km | - | - | - | 0.0045 | 0.0045 | 0.0045 |

M category include motor vehicles having at least four wheels and for the carriage of passengers
 N1 Class I include Power-driven vehicles having at least four wheels and for the carriage of goods (< 3.5 tonnes)
 N1 Class II include Power-driven vehicles having at least four wheels and for the carriage of goods (>3.5 tonnes and < 12 tonnes)
 N1 Class III include Power-driven vehicles having at least four wheels and for the carriage of goods (> 12 tonnes)
 Source: http://transportpolicy.net/index.php?title=India:_Light-duty:_Emissions

Fig1. Emission standards for light weight vehicle

II. WHEN THE VEHICLE EMISSION CONTROL BEGINS IN INDIA

In India the vehicle emission control is started for petrol vehicles in 1991 and it is the first time takes the various steps to control the mass emission norms. Then, they started to control the emission from diesel vehicles in 1992 after implement the both norms slowly tightened the emission norms in 1996 with more compulsory fitment along catalytic converter in cars for petrol engines. Bharat stage emission norms are equivalent to euro norms for every four wheeler vehicle and it may firstly introduced in 2000. In this norms they specified the maximum permissible limitation for particulate matter (PM), carbon monoxide (CO), hydrocarbons (HC), nitrous oxide (NO_x).

III. TO DEVELOP TECHNICAL UPGRADES

For implementing BS-VI norms the company are facing lot of technical challenges to develop the technology changes for improving the engine combustion and calibration, to increase the injection pressure along cylinder pressure, PM and NO_x is formed after solution and to increase the source of electronic controls. For technology upgrade in passenger cars fixing the basic two engine fitments from BS-VI norms to BS-IV norms.

DPF (Diesel particulate matter) - It mostly using in diesel vehicles to reduce the particulate matter.

SCR (Selective catalytic reduction) - It commonly using to reduce the NO_x emissions.

The major requirements is needed to fit the DPF- bonnets in Indian small diesel cars is to change some engineering work and to change major design process from industries.

The Indian road way is only applicable for low driving speed so it doesn't produce more temperature in the DPF at burning the shoot. As per the European road condition the heat is developed up to 600 degree Celsius so the Indian auto makers are planning to modify the methodology and producing 400 degree Celsius temperature from engines. Various company suppliers are searching the different type of solution with Indian market association.

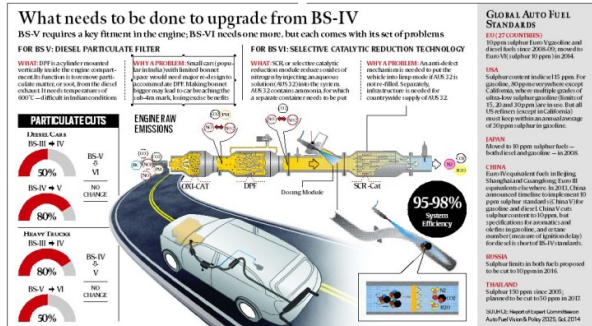


Fig2. Simple sketch for upgrade BS-VI

IV. CHALLENGES

The government of India facing many challenges to bring BS-VI norms at Oil Company to upgrade the fuel quality and with cost management of product. For every norm they want to change the quality of fuel and to reduce the emission formation with help of different bonnets like diesel particulate matter and selective catalytic convertor is high using in BS-VI norms. In that we see one by one challenging process takes place to implementing BS-VI norm.

5.1 INVESTMENT

By the technological upgrade is takes place in vehicles as per the government of India, the price of the petrol car is increased up to Rs: 20,000 – 30,000 and the price of the diesel passenger vehicles is completely increased up to Rs: 75,000 – 1,00,000. So the diesel cars usage is slowly reduced due to its cost is high and then it polluting morethan petrol cars recently the diesel fuel prices is closer to petrol.

5.2 FUEL QUALITY

In the BS-IV norms both petrol and diesel is consist of less Sulfur, it may present most in air pollution. To control the emission based on efficiency of catalytic converters is reduced at the presences of sulfur. In petrol and diesel having 50 parts per million (ppm) content of sulfur present in BS-IV as compared with BS-III standards the petrol having the content of 150 parts per million (ppm) and 300parts per million (ppm) of sulfur.

5.3 FUEL COST

The oil companies are highly invested up to Rs:30,000 Crore in the year of 2005 and 2010 for upgrading the fuel quality for auto industry but now oil firms are investing

Rs:40,000 Crore for fuel quality upgrading to BS-VI norms and the automakers are investing additionally in price of vehicles.

5.4 BHARAT STAGE NORMS

| Emission norms | NOx | HC | CO | PM |
|----------------|------|-----|-----|----|
| BS-III | 0.15 | 0.2 | 2.3 | - |
| BS-IV | 0.08 | 0.1 | 1 | - |
| BS-VI | 0.06 | 0.1 | 1 | 0 |

Fig3.Table-1: Petrol Emission Norms (In g/Km)

| Emission norms | NOx | HC | CO | PM |
|----------------|------|------|------|-------|
| BS-III | 0.56 | 0.5 | 0.64 | 0.05 |
| BS-IV | 0.3 | 0.25 | 0.5 | 0.025 |
| BS-VI | 0.17 | 0.06 | 0.5 | 0.005 |

Fig4.Table-2: Diesel Emission Norms (In g/Km)

VI. CONCLUSION

In India the auto makers and OEMs (original equipment manufacturers) are more planning to shift the BS-VI norms in a period of 6-7 years and the opinion of auto suppliers are starts making and invest more on technology to shift the new norms for a vehicle. It is the real challenge to auto makers to bring BS-VI norms in the year of 2020 in India and the customers are satisfied with vehicle quality and affordable prices are available in Indian auto-market.

References

[1] This paper is completely referred in article about automobile published by times of economics and it completely referred from Google.

