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Assessment of Reduce Fuel Consumption and Vehicular Emissions

Dheeraj Shukla
M.Tech. Research Scholar
Energy Technology
Takshshila Institute of Engineering & Technology
Jabalpur, (M.P.) India
Email: dheerajshuklekar@gmail.com

Pramod Dubey
Assistant Professor
Department of Electrical & Electronics Engineering
Takshshila Institute of Engineering & Technology
Jabalpur, (M.P.) India
Email: pramoddubey@takshshila.org

Abstract:—*We went to different traffic signals of Jabalpur city and made a survey for a week and calculate the extra fuel consumed at traffic signals for a week. With the help of this data we are determining the total fuel which is wasted at traffic signals in a week and then for a month in Jabalpur as well as an approximate data for extra fuel consumption at traffic signals for Madhya Pradesh. This thesis also gives the detail about the emissions of carbon dioxide by consumption of this extra fuel at the traffic signals, when the engine in ON. This project also shows the need of development of traffic flow, traffic signals and developing awareness in humans of wastage of this fuel. As fuel resources are limited and are going to be exhausted in near future, and also burning of fuel causes pollution which ultimately affects adversely on the environment and living beings. So, fuel should be used properly and these types of wastages should be avoided.*

Keywords:— *Factors Influencing, Fuel Wastage, Co2 Emission, Population Growth, Urbanization Economic Development.*

1. INTRODUCTION

In developing countries like India, rapid urbanization and industrialization coupled with rapid population growth has led to explosion in the number of vehicles in recent years. At the same time our roads infrastructure and our traffic management system has not been designed to cope with such a heavy vehicular load, leading to heavy traffic congestion at busy signal points in big cities as Jabalpur. Traffic signals have become an invaluable tool in ensuring smooth flow of motor vehicles at crossings. But where we gain in terms of orderly flow of traffic, we lose out in fuel wastage and pollution. This is because people often leave the engine of their vehicle running while waiting at signals. In this paper, we propose a system that targets this problem. By creating a channel of communication between the traffic signal and the vehicle, we can ensure that the engine is shut off automatically. Various parameters are taken into consideration during the controlling of the engine start-stop action. When these parameters are found to be within a given set of conditions, the engine is shut off. If any one of these parameters changes, the engine is turned on automatically, saving the driver the hassle of turning the engine on manually .Now a days the fuel consumption (wastage) in traffic signal is most critical factor as the resources of fuel are near to exhaust, i.e. will not be for so long time, just up to 2025 as predicted. Growing concern about environmental protection and energy conservation has led the Clean Air Act Amendments and a number of regulations to increase fuel economy and reduce emissions. Since in most of the countries, fuel consumption is by the transportation sector (65.1%) and fuel consumed by vehicles is

about 75% of all transportation energy use developing ways to reduce automobile fuel consumption in traffic systems has become an important task. Fuel wastage in traffic systems can be reduced by increasing fuel economy of new vehicles and optimizing traffic control measures. Fuel economy can be improved by improving new vehicle technology and design. Vehicle fuel consumption and engine emissions are two critical aspects that are considered in the transportation planning process of highway facilities. Transportation is one of the major contributors to man-made polluting emissions. Highway vehicles, which contribute more than one-third of the total nationwide emissions, are the largest source of transportation-related emissions. In our thesis we can clearly observe that the lots of fuel consumption come in traffic signal. Understanding and quantifying the extra fuel consumption by motor vehicles on different traffic signals is an important step towards quantifying wastage of fuel. The main problem today is limitation of fuel resources which demands saving of fuel. Taking this in consideration, we made a survey of different traffic signals and prepared data sheet of signal timings and number of vehicles in ON condition at the traffic signals. First of all with the help of our bike - Bajaj CT-100 and a mileage calculating test kit, we have calculated the fuel consumed by a vehicle in milliliter per second, when the bike engine is ON and bike is not running. This gave us a factor in ml/sec to calculate the fuel consumed at the traffic signals for 100-CC motor-bikes. With the help of this we calculated factors for 150-CC and 1000-CC. This 1000-CC we have taken as for the four wheelers. This 100-CC and 150-CC and taken as an average number of two wheelers are of this kind. This calculation helped us to make the further calculations of extra fuel that is consumed at the traffic signals. Detail of this testing is mentioned in Chapter-2 Test and Methodology. We went to different traffic signals of Jabalpur city and made a survey for a week and calculate the extra fuel consumed at traffic signals for a week. With the help of this data we are determining the total fuel which is wasted at traffic signals in a week and then for a month in Jabalpur as well as an approximate data for extra fuel consumption at traffic signals for Madhya Pradesh.

2. FACTORS INFLUENCING THE FUEL WASTAGE:

Driving Habits:

There are infinite variations that can affect the driving styles. Some factors that influence the driving techniques of the motorcyclist are

- Type of roads
- Weather Conditions; and
- Traffic flow

The type of roads and weather conditions are two things beyond the control of the motorcyclist. However, traffic flow can be improved and streamlined if the motorists, motorcyclists and pedestrians respect each other and avoid over speeding. Over speeding not only takes its toll in terms of fuel penalty but also increases risks for an accident.

Fuel can also be saved by strictly avoiding unnecessary

- Throttling
- Idling
- Use of clutch

Throttling: Frequent acceleration and braking consumes up to 50% extra fuel required to reach a particular destination if driving at a cruising speed of 45 km/hr. It causes excessive tyre wear and also reduces life of brake pads. Always accelerate gently and anticipate stops to avoid sudden braking.

Idling: Switch off motorcycle engine when not in use and avoid excessive throttling when waiting at traffic lights. Do not leave unattended motorcycle with engine idling, as this wastes fuel.

Clutch*:* Using the clutch reduces a lot of useful power generated by engine and results

in unnecessarily wasted fuel. Always use the clutch smoothly and only when necessary.

3. GROWTH RATE OF MOTOR VEHICLES AND POPULATION GROWTH RATE IN INDIA:

Growth rate of Motor Vehicles in India:*

The growth rate of vehicles is the backbone of economic development and the Indian automotive Industry is the second fastest growing in the world.

- About 8 million vehicles are produced annually in the country today.
- In 2012, the country reported 121.63 million registered motor vehicles, a motorization rate of 22 vehicles per 1000 population (Road Transport Yearbook, 2008).
- Over the last three decades, motor vehicles numbers have been doubling every ten or fewer years in India.
- Automobiles are the primary sources of air pollution in India's major cities. In India, transport sector emits an estimated 261 kg of CO2, of which 94.5 %was contributed by road transport.
- The transport sector in India consumes about 17 % of total energy & is responsible for 60% of the Green House gas from various activities.

India has experienced tremendous growth rate in motor vehicle in recent years. The total number of motor vehicles increased from 52.37 million in 2000 to 121.63 million in 2012-i.e. an average growth rate of 9 % per year in the country. Some analysts predicted that India's motorization rate will continue to grow to 40 vehicles per 1000 by 2020.

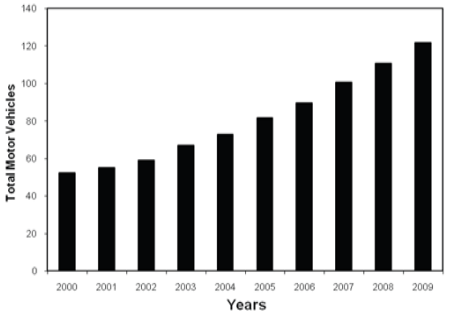

Figure 1: Total Motor Vehicle in India, 2000-2012

The largest majority of vehicles in India are found in metro cities. Number of vehicles in Indian cities is 40 million with a share of 30 % of total vehicles in India.

Chennai, Bangalore, Kolkatta, Delhi and Mumbai with 15.2 million vehicles constitute 38 % of total vehicles of important cites and 13 % of total vehicles in India (Motor Transport Statistics, 2012).

The second tier cities like Coimbtore (12 %), Mudrai (11 %), Nagpur (14.6 %) and Vishakhapatnam (17.2 %) posted a compound annual growth rate (CAGR) of about 11 % or more. Mumbai & Chennai posted a growth rate of 6.2 % and 13.2 % respectively (Road Transport Year book, 2012).

Table 1: Estimation of fuel wastage and fuel cost for Jabalpur and Madhya Pradesh:

Emission CO2	Petrol	Diesel	LPG
Fuel Wastage of Jabalpur Square per Year (L)	207788L	133308L	91899Kg
Emission CO2 in Kg	497028.9 Kg/Year	351933.1 Kg/Year	206733.6 Kg/Year
Fuel Wastage in MP (435 Square) per Year (L)	3527964 L	2317716 L	1597320 Kg
Emission CO2 in Kg	8438889.8 Kg/Year	618770.24 Kg/Year	3597164.64 Kg/Year

Table 2: District of Madhya Pradesh

Sagar	Alirajpur	Anuppur
Damoh	Balaghat	Barwani
Seoni	Bhind	Bhopal
Shadol	Chattarpur	Chhindwara
Shajapur	Datia	Dewas
Tikamgarh	Buhanpur	Dhar
Sidhi	Dindori	Guna
Ujjain	Gwalior	Mandla
Betul	Harda	Hosangabad
Sehore	Jabalpur	Katni
Shivpuri	Jhabua	Singrauli
Khandwa	Khargone	Sheopur
Mansaur	Morena	Ashoknagar
Neemuch	Panna	Vidhisha
Raisen	Narsinghjpur	Satna
Rajgarh	Ratlam	Rewa

Table 3: Estimation of fuel wastage and fuel in Traffic Square for Jabalpur and Madhya Pradesh

Traffic Square	Petrol	Diesel	LPG
Fuel Wastage of Jabalpur 25 Square per Month in Rs	11,32,233	5,33,232	2,67,750
MP(435) per Day L	9,799.9	6,438.1	4,437
MP(435) per Month L	2,93,997	1,93,143	1,33,110
MP(435) per Year L	35,27,964	23,17,716	15,97,320
MP(435) per Month Fuel Cost	1,96,97,799	92,70,864	46,58,850
MP(435) per Year Fuel Cost	23,63,73,588	11,12,50,368	5,59,06,200

Table 4: Estimation of fuel wastage per Week fuel in Traffic Square

Traffic Square	Fuel Wastage per Week (in Litre)
Malviya Chowk	338.89
Damoh Naka	337.89
Medical	271.90
Vijay Nagar	492.427
Bus Stand	421.83
Rampur	186.9
Adhar Tal	279.16
Total	2329.0

Table 5: Estimation of fuel wastage Traffic Square within Time Duration

Time	Square	Four Wheeler	Three Wheeler	Two Wheeler
9AM -2PM	Malviya Chowk	65	65	77
	Damoh Naka	80	80	88
	Medical	78	78	89
	Bus Stand	80	80	85
	Vijay Nagar	69	69	95
	Rampur	88	88	97
	Adhartal	70	70	80
2PM-9.30PM	Malviya Chowk	85	90	95
	Damoh Naka	100	100	100
	Medical	100	100	98
	Bus Stand	97	100	98
	Vijay Nagar	95	100	100
	Rampur	100	100	100
	Adhartal	90	95	97

REFERENCES:

[1] Esteban B, Baquero G, Puig R, Riba JR, Rius A. Is it environmentally advantage ousto use vegetable oil directly as bio fuel instead of converting it to biodiesel?Biomass and Bioenergy 2011;35:1317e28.

[2] Agarwal AK. Biofuels (alcohols and biodiesel) applications as fuels for internal combustion engines. Progress in Energy and Combustion Science 2007;33:233e71.

[3] Bryant L. The development of the diesel engine. In: Technology and culture, vol. 17. The Johns Hopkins University Press; 1976. p. 432e46.

[4] Srivastava A, Prasad R. Triglycerides -based diesel fuels. Renewable & Sustainable Energy Reviews 2000;4:111e33.

[5] Wander PR, Altafini CR, Moresco AL, Colombo AL, Lusa D. Performance analysis of a mono-cylinder diesel engine using soy straight vegetable oil as fuel with varying temperature and injection angle. Biomass and Bioenergy 2011;35:3995e4000.

[6] Agarwal D, Agarwal AK. Performance and emissions characteristics of Jatropha oil (preheated and blends) in a direct injection compression ignition engine. Applied Thermal Engineering 2007;27:2314e23.

[7] Purushothaman K, Nagarajan G. Performance, emission and combustion characteristics of a compression ignition engine operating on neat orange oil. Renewable Energy 2009;34:242e5.

[8] Devan PK, Mahalakshmi NV. A study of the performance, emission and combustion characteristics of a compression ignition engine using methylester of paradise oileeucalyptus oil blends. Applied Energy 2009;86:675e80.

[9] Agarwal AK, Dhar A. Comparative performance, emission and combustion characteristics of rice-bran oil and its biodiesel in a transportation diesel engine. Journal of Engineering for Gas Turbines and Power, Transactions of ASME 2010;132:064503-1e064503-4.

[10] Agarwal AK, Dhar A. Experimental investigation of preheated Jatropha oil fuelled direct injection compression ignition engine: Part I, performance, emission and combustion characteristics. Journal of ASTM International 2010;7:1e13.