

Inspection & Maintenance for In-use Vehicles in India

GITE Regional Workshop on Inspection and Maintenance Policy in Asia
10-12 December 2001, Bangkok, Thailand

Background

The economic development in the last two decades has impacted the metropolitan cities more than the rest of the country in India. The high rise buildings, the shopping malls, the fly-overs are a sharp contrast to much of the Indian countryside. However, this quick growth has also brought with it the unavoidable problems of urbanisation – and as people go about their lives at high speeds, air quality in general and emissions from vehicles in particular has become an issue of primary concern.

Vehicle population in India has also grown very rapidly in the last decade. Two and three wheelers have multiplied by a factor of five while the passenger cars and diesel vehicles have increased by more than two and half times during this period . Vehicle population in India was estimated to be 27.8 million in 1994-95 and is currently (2000-2001) estimated at 53.0 million. During the next 5 years the vehicle population may grow to more than 75 million. Two & three wheelers account for more than two-third of total vehicle population. The growth of vehicle population in India is given below:

Vehicle Population (in Millions)

Year	2-W	3-W	Cars	MUVs	CVs	Total
1986	6.13	0.39	1.28	0.39	1.06	9.25
1991	14.05	0.76	2.28	0.73	1.74	19.56
1998	28.74	1.40	3.94	0.86	2.31	37.25
2000	38.77	2.51	4.72	1.10	2.39	49.49

With a view to combating deteriorating air quality, stringent environmental regulations are being mooted. The automobile industry in India has been meeting these challenges. In recent years, the industry has made significant investment to produce safer and increasingly environment friendly vehicles. It is striving to catch up with the European emission norms. In fact, in the two wheeler segment, new Indian vehicles already meet one of the most stringent emission standards in the world. A road map proposed by SIAM for next stage of emission norms is given below:

Vehicle Category	EURO III	EURO IV	GAP with Europe
Passenger Cars	2003/2004	2005/2006	1 year
MUV's	Skip Euro III	2006/2007	2 years
Commercial Vehicles	Skip Euro III	2007/2008	2 Years
2&3 Wheelers	2005	2009	India Unique norms

Thereafter a Inter-Ministerial Task force have suggested revised road map for introduction of next stage of emission norms based on the capability of oil companies to provide matching fuel quality. The roadmap defined by the committee is given below.

Vehicle Category	Bharat Stage II (All Over India)	Bharat Stage III (Seven Mega Cities)
Passenger Cars	April 2005	April 2005
MUVs	April 2005	April 2005
Commercial Vehicles	April 2005	April 2005
2&3 Wheelers	-	April 2005

However, whilst the new vehicles are cleaner and meeting stringent emission requirements, the benefits are not being reflected in the ambient air quality due to the presence of a large number of old and ill maintained polluting vehicles.

A point that is often not recognised is that mass emission norms for vehicles were legislated in India only in 1991. Therefore, the emission performance of pre – 1990 vehicles is significantly inferior to those produced thereafter. From the earlier charts it is evident that the vehicle population in India has increased five folds from 1986 to 2001 but the corresponding pollutant to ambient air has increased only three times as shown in the table given below. The estimates were done based on the vehicle population of India and the emission patterns of each category of vehicle.

Tonnes of Emission per day (CO+HC+NOx+PM)

Year	2-W	3-W	Cars	MUVs	CVs	Total
1986	1,134	912	1,112	1,059	5,775	9,992
1991	2,598	1,787	1,985	2,004	9,528	17,901
1998	4,486	2,923	2,377	2,099	11,943	23,828
2000	5,775	4,910	2,562	2,282	12,272	27,800

Notwithstanding the progressively tighter emission regulation since 1991, air quality has shown deterioration, because of the large population of old vehicles, which are generally in a poor condition of maintenance. In the absence of a regular maintenance and repairing culture even new vehicles tend, over a period of time, to deteriorate in their mechanical conditions and so emit more pollutants than at the time of their commissioning.

Despite its far lower vehicle penetration as compared developed countries, India also has an accident rate higher than that of the developed world. The number of fatalities in road accidents in the metropolitan cities is also a matter of grave concern. As vehicle population keeps increasing year after year, the menace of pollution and safety hazards threaten to destroy the very fabric of existence and well being of our society and quality of life.

Therefore, there is a need to introduce proper Inspection & Certification (I&C) systems with facilities to test a vehicle for all the parameters.

I&C for Better Air Quality and Increased Safety

Based on several studies conducted in various parts of the world, it is widely recognised that old vehicles are the gross polluters that can contribute upto 80% of the pollution in the major cities. The Supreme Court in India has therefore directed drastic measures to phase out old vehicles from operating in the city of Delhi. Phasing out 15-year-old transport vehicles from 2 Oct.1998 commenced the process, and by year 2000 only 8 year old vehicles were allowed to operate in Delhi. There is no doubt that such a drastic step will help improve air quality very significantly - taking into account the likely increase in vehicle population. But this can at best be a one time exercise, considering the costs involved. Similar measures are also being considered for other States and cities of India.

It must be remembered that even new vehicles with the state-of-the-art-technologies, will deteriorate in service and must be maintained properly if they are to continue to operate at the emission levels for which they are designed and manufactured. Considering that a large percentage of the vehicle population in India belong to the pre-emission control period, i.e. prior to 1991, and that a large majority of these vehicles are poorly maintained, it is apparent that these vehicles

are the gross polluters and need to be tackled on priority for emission - abatement.

Similar is the case with vehicle safety. The Government of India has notified stringent safety regulations for motor vehicles in line with international practices and vehicles have to satisfy certain basic safety standards.

The Motor Vehicle Rules prescribe that a Transport Vehicle (Bus, Truck, Taxi or an Auto-Rickshaw) is required to undergo Annual Fitness Certification. This function is carried out by the Motor Vehicle Inspector (MVI) attached to the State Transport Department. A MVI is responsible to check the safety features such as brakes, lights, general wear and tear apart from emissions from all these vehicles. However, the sheer number of vehicles involved makes it difficult for this exercise to be carried out effectively given the constraints of manpower and lack of adequate equipment. Alternative measures have therefore to be considered.

Present Scenario

Fitness Check:

In India, the fitness Certification is being carried by the motor vehicle inspectorate, known as Regional Transport Offices (RTOs) attached to the Transport Department in each State, which has its offices in the Capitals as well as in the major cities of the States. The RTOs are responsible not only for fitness certification but also for a number of various tasks e.g. new registration, issue of driving licenses, transfer of vehicle ownership etc. The responsibility of these officers rotates among these different tasks.

The Transport Departments, by and large, depend on visual checks and limited road tests (for checking brakes) for inspecting the vehicles for fitness certification except for emissions which is checked using a smoke meter or Gas Analyser.

As per Central Motor Vehicle Rules (CMVR) all transport vehicles should carry a Fitness certificate which would be valid as given below:

New Transport Vehicles	Two Years
Renewal of Certificate of fitness	One year

Non-Transport Vehicles i.e. Passenger Cars and Two-Wheelers are required to take the fitness test once at the time of initial registration and the same is valid for a period of 15 years.

Emission Check:

Though the mandatory fitness test as mentioned above also necessitates the vehicle to be tested for emission compliance, all vehicles need to get emission check done once in every six months, at any of the Authorised Emission check Centres.

The emission check of vehicles is mandatory for all categories of vehicles that are Two-Wheelers, Three-wheelers, Cars, Buses and Trucks. The State Transport Department has authorised private entrepreneurs to operate emission test centres and issue test certificates after necessary emission check. These Emission Check Centres are primarily located at fuel dispensing stations and some at private garages.

For petrol vehicles the idle emission limits are as follows:

- 4.5% by Vol. of Carbon Monoxide for Two & Three-Wheelers
- 3.0% by Vol. Of Carbon Monoxide for Four-Wheelers

And for Diesel Vehicles it is:

- 65 Hartidge Smoke Units (HSU) measured by Free Acceleration method.

Initiatives taken by SIAM

SIAM is an apex industry body representing 35 leading vehicle and vehicular engine manufacturers. Although SIAM's principal focus remains on technology with emphasis on environmental and safety aspects, it is committed to playing a proactive role on all issues that promotes sustainable development of the Automotive Industry.

SIAM is an important channel of communication for the Automobile Industry with the Government, national and international organisations. Dissemination of information is an integral part of SIAM's activities, which it does through various publications, reports on production and sales, organising seminars and conferences. SIAM also organises, biennially, the Auto Expo series of Trade Fairs in co-operation with the Confederation of Indian Industry (CII) and Automotive Component Manufacturers Association of India (ACMA).

SIAM has been striving to keep pace with the socio-economic and technological changes shaping the Automobile industry, while trying to fulfil its endeavour to be a catalyst in the development of a stronger Automobile industry.

As mentioned earlier the large population of old ill maintained vehicles are contributing significantly to the deteriorating air quality and thus the new technologies introduced by vehicle manufacturers get negated by the ill maintained vehicles.

SIAM believes that improving of air quality needs an integrated approach by way of improving vehicle technology, improving fuel quality, have better traffic management, introduce alternate fuel driven vehicles and have a good Inspection and Maintenance programme.

To inculcate a culture of Inspection and Maintenance of vehicles SIAM has organised several I&M camps in all major cities of India covering more than one hundred thousand vehicles. These Camps are organised by SIAM with

participation of vehicle manufacturers along with the State Governments. These camps function for several days at prominent locations of the city where SIAM sets up temporary inspection lanes for emission check of vehicles. A vehicle failing the emission test is sent to the maintenance section in the camp where free maintenance is done by service personnel of vehicle manufacturers. These camps generate lot of awareness among vehicle users and have prompted the State Government to improve the I&M system in the State.

The largest programme organised by SIAM was in Delhi, where about 66,000 vehicles were checked in a period of 18 days at 12 locations. An unprecedented quantity of data is collected from all the participants: driver demographics (age, occupation, driving habits, etc.), vehicle characteristics (type of vehicle, age, type and size of engine, etc.), and measurements of Carbon Monoxide (CO) and Hydrocarbon (HC) emissions before and after any maintenance was performed. Smoke opacity measurements were also collected as sample from two-wheelers tested in the camps. Outside the camps, fuel efficiency tests on several hundred two-wheelers around the city were also conducted at dealers' service centres. For a sample of several hundred vehicles who participated in the camps, the decline in emission performance from the day of the initial test was measured at three-month intervals, over a period of one year. Mass emission tests, which provide a true measure of emissions, and idle emission tests were also conducted on a relatively small number of vehicles at a R&D facility of Indian Oil Corporation after the camps to study the effect of maintenance on mass emission values.

One of the major infrastructures for I&M in India is the presence of Emission Test Centres in various parts of the country. Cities like Delhi and Mumbai have more than 400 Emission Test Centres each. The emission checking system in these centres is far from satisfactory and has not served the purpose of identifying highly polluting vehicles. Most of these Centres are not operating professionally, resulting in emission certificates being given to vehicles which would otherwise fail an emission check. In a typical Indian city only 20% of vehicle report for an emission check and the Transport Department does not have any data to identify the list of vehicles not adhering to the mandatory requirement of emission check. To address the inadequacies of the present emission checking system, SIAM has developed a Computerised emission checking system and has demonstrated the new system which could also be integrated to the present system for improving the credibility of the emission test system.

In this system the Gas analyser is connected to a Computer which has a printer and a web Camera. The emission values from the Gas analyser is sent directly to the computer and the photograph of the registration number plate of the vehicle is also captured. The emission data generated is stored in the computer which is sent periodically to the Transport Department. A schematic diagram of the new system and the Test Certificate is given below:

EMISSION TEST CERTIFICATE
(Rule 231 (B) (81 of CMV Rules 1989))

Serial Number : EACCC00100005 Make : TVS Date : Apr 04, 2001
 Registration Number : KA 05 EA 2192 Model : SHREK Time : 3:00:40 PM
 Year of Registration : 1999 Type of Engine : 25 Catalyst : No
 Speedometer Reading : 4500
 (km)
 Type of vehicle : 2W

Test Result: IDLING

	Regulation (%)	Actual Reading	
CO	4.5	2.4	Pass

This vehicle has been tested as per details shown in the certificate and meets the Emission Standards prescribed by the Rule 231(C) of Central Motor Vehicle Rules 1989.

GRADE : A A Valid Upto: Oct 04, 2001

SEAL OF TEST STATION	CODE OF TEST STATION	TRANSPORT DEPT. SEAL
----------------------	----------------------	----------------------

The objective of this system is to:

- Eliminate/ Minimise malpractices currently in vogue with respect to issue of Emission Test Certificates and minimise human interventions by computerising the process.
- Improve credibility and acceptance of the Certification process, thereby establishing some discipline of periodic maintenance and certification of in-use vehicles. This would help in keeping emissions from in-use vehicles under control.
- Establish a strong database of vehicles tested, which can be made use by the Government Authorities for taking policy decisions.

Benefits of the Computerised Emission Checking System

- Emission values are recorded on the computer without intervention of the operator thereby eliminating possibility of manipulation of emission values by the operator.
- Introduction of photograph of the number plate confirms physical presence of the vehicle at the recorded date and time of the test.
- Good database will help in tracking vehicles which do not report to a PUC Centre for an emission check or those vehicles which fail in the test.

Future Action Plan

- All Emission Test Centres to be computerised at least in the mega cities - State Governments to play a key role
- All Computerised Centres of a city to be interconnected
- Data Management
 - Test data will be automatically stored into the computer during the testing period. This data can be uploaded to a server, installed at the Transport Department, periodically. It would help the respective State Governments to analyse the data and take policy decisions.

SIAM Model Centres

SIAM has set up model Computerised Emission Test Centres in five major cities as demonstration projects and is in the process of setting up few more Centres. These Centres are being monitored closely by the State Transport Department. States like Delhi and Karnataka have accepted SIAM's new system and have entrusted SIAM to prepare a roadmap for converting all the emission test Centres to the Computerised system. SIAM is working closely with the Equipment manufacturers, the Test Agencies and with both the Central and State Governments to assist them in improving the emission checking system in India.

Fitness Checking System:

SIAM is assisting the Ministry of Road Transport and Highways, Government of India for preparing a plan for modernising the Fitness Checking system for in-use vehicles in India. SIAM has proposed the formation of a **National Board for Fitness Certification in India**. This board will work under the aegis of Ministry of Road Transport and Highways and would formulate the systems and procedures, including equipment specifications, for setting up and operating modern fitness Certification Centres in India. This Board will also assist the State Governments to set up their own regional board for operating the fitness test centres. The plan has been accepted by the Government and necessary action is being initiated for formation of such a Board for the country.

In Conclusion:

India needs to have a two-pronged approach for improving Inspection & Maintenance system in the Country. The first is to extend Fitness Certification test for all categories of vehicles and set up necessary infrastructure for modernising the fitness testing system, secondly the emission checking system should be made more effective by Computerising the checking procedure as demonstrated by SIAM.

New Delhi
November 2001