



Mr. Balraj Bhanot

Former Director ARAI, India

**Presentation on Vehicular Inspection &
Certification Regime**

at

IRF workshop

5.10.2011

By

Balraj Bhanot

Chairman (TEDC)

&

Adviser DIMTs

Former Director (ARAI) & Chairman CMVR(TSC)

CMV Rule 62

Certificate of Fitness in respect of Transport Vehicles

Safety devices to be checked on the vehicle for validity of fitness:

- 1. Spark plug / suppressor cap/ high tension cables**
- 2. Lighting and light signalling devices (Retro-Reflectors, Tapes, Bulbs etc.)**
- 3. Rear view mirrors**
- 4. Safety glass**
- 5. Horn**
- 6. Silencer**
- 7. Dashboard equipments**
- 8. Widescreen wiping systems**
- 9. Exhaust emission**
- 10. Braking systems**
- 11. Speedometer**
- 12. Steering gear**

Safety Devices for Retro-Fitment on In-Use Transport Vehicles

- **Retro-reflective Tapes**
- **Rear Underrun Protection Device (RUPD)**
- **Lateral Underrun Protection Devices (LUPD)**
- **Lighting and Light-signalling devices.**
- **(Headlamps, Rear/front position lamps, stop lamps, end out marker lamps, side-marker lamps, front, rear and side retro-reflectors)**
- **Spray Suppression Devices (4w).**
- **Chocks for Traction**

Item	Check fitment	Check make/type/rating	Check Condition	Check functioning	test	Remark
Spark plug / Suppressor cap/Tension cable	Yes	Yes	Yes	No	No	-
Head lamp beams	Yes	No	Yes	Yes	Check	Beam Focus
Other Lights	Yes	No	Yes	Yes	No	Unauthorized light Not fitted
Reflectors	Yes	No	Yes	No	No	Colour of reflector and reflective tape
Bulbs	Yes	Yes	Yes	No	No	Bulb Wattage
Rear View Mirrors	Yes	No	Yes	No	No	

Item	Check fitment	Check make/type/rating	Check Condition	Check functioning	test	Remark
Safety Glass	Yes	Yes	Yes	No	No	Type of glass to be used
Horn	Yes	No	Yes	Yes	No	
Silencer	Yes	No	Yes	Yes	No	Ensure no leakage
Dash Board Equipment	Yes	No	Yes	Yes	No	
Wind shield wiper	Yes	No	Yes	Yes	No	
Exhaust Emission	No	No	No	No	Yes	PUC Certificate
Braking System	Yes	No	Yes	Yes	Yes	As per rule 96(8)
Speedometer	Yes	No	Yes	Yes	No	As per rule 117

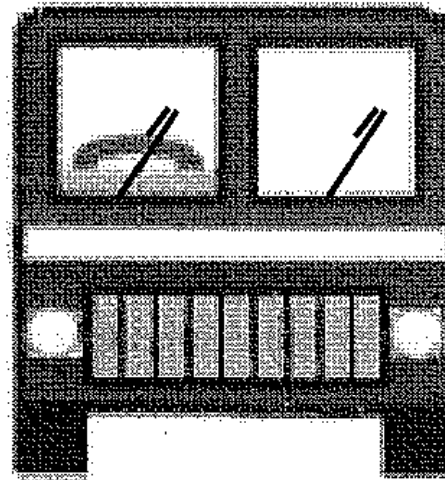
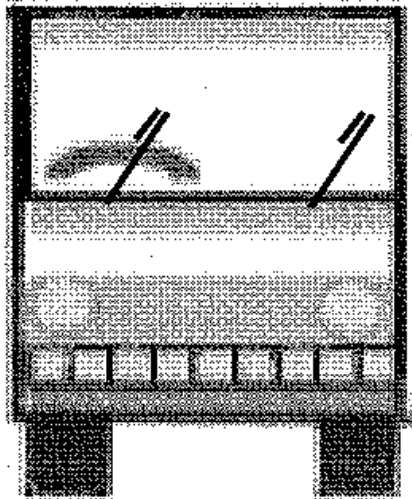
Item	Check fitment	Check make/type/r ating	Check Condition	Check functioning	test	Remark
Steering Gear	Yes	No	Yes	Yes	Check free play	As per rule 98

CMV Rule 62

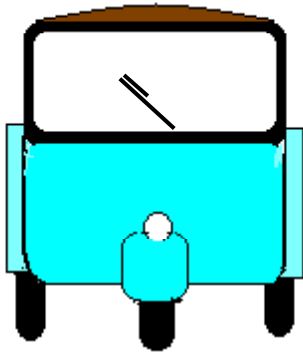
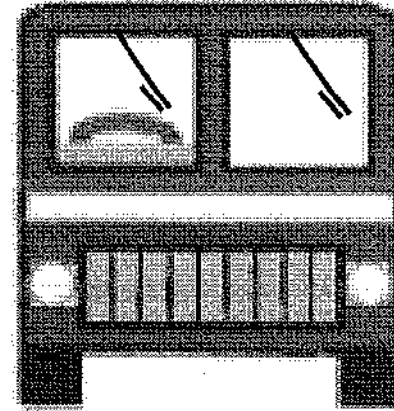
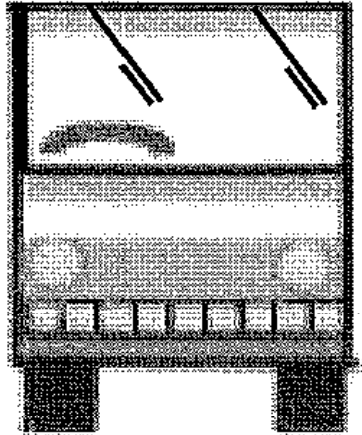
Windscreen Wiping System

1. Check Fitment:

On Transport Vehicles: Passenger and Goods
Examples

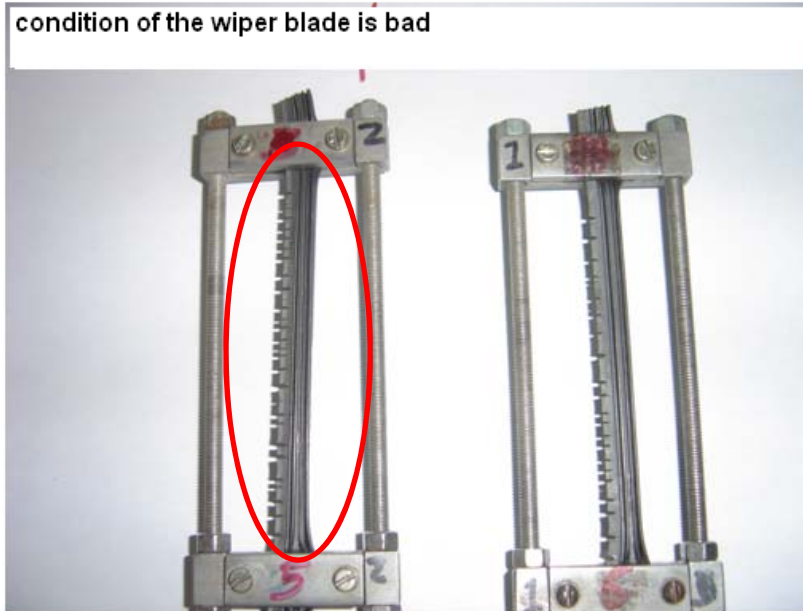


Examples



2. Check Conditions :

Condition of the wiper blades is bad



Condition of the wiper blades is good



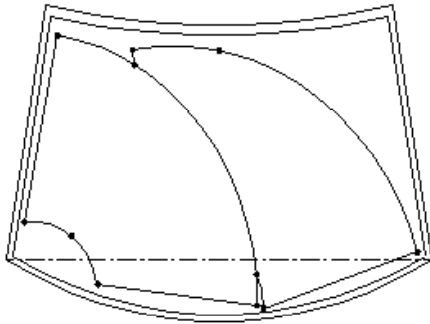
3. Check Functioning:



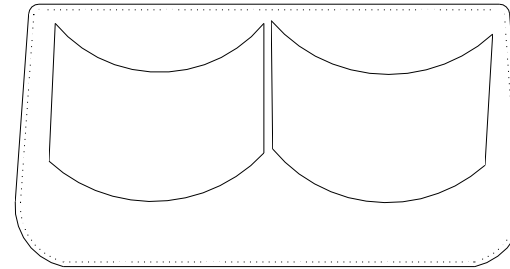
- After putting the dust on the entire glass and after five to six wiping cycles the wiping pattern area should be clean. There should not be dust left on the pattern area. (Test dust is available at ARAI)
- Frequency of Wiping :
- If there is only one, then it should be minimum 30 cycles/min.
- If there are two frequencies the difference between the two should be minimum 15 cycles/min.

- **Typical Windscreen Wiping Area Patterns of Vehicles:**

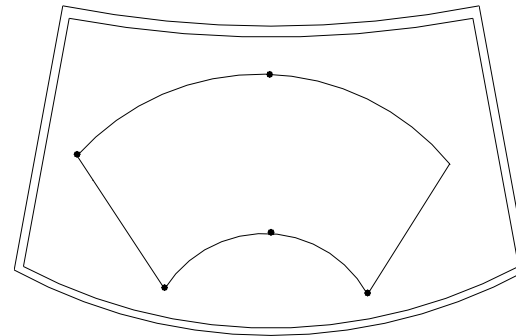
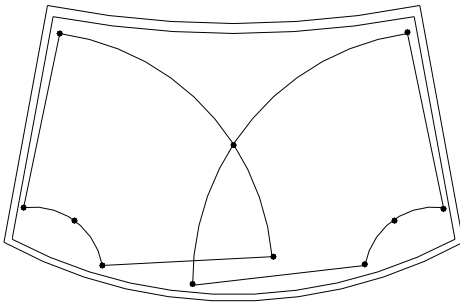
Passenger car



Heavy Vehicles



Three Wheeled Vehicles

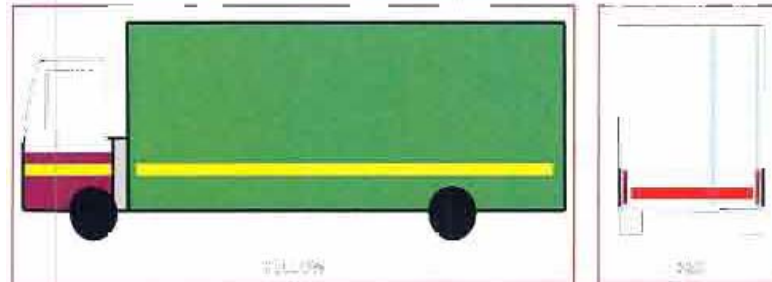


CMV Rule 62

Retro-Reflective Tape

- "Marking" means a rectangular strip or a series of such strips intended to be placed in such a way that it identifies the entire length and width of a motor vehicle and its trailer when viewed from the side (side marking) or rear (rear marking).
- "Conspicuity marking" means a device intended to increase the conspicuity of a vehicle, when viewed from the side or rear, by the reflection of light emanating from a light source not connected to the vehicle, the observer being situated near the source;
- "Contour marking" means a conspicuity marking intended to indicate the horizontal and vertical dimensions (length, width and height) of a vehicle;

➤ **Line Marking** : means a conspicuity marking intended to indicate the horizontal dimensions (length and width)of a vehicle by continuous line.



➤ **Partial Counter Marking**: Means a counter marking that indicates the horizontal dimension of the vehicle by continuous line and the vertical dimension by marking the upper corners.



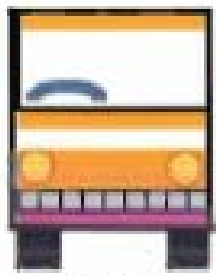
- **Full Counter Marking:** Means a counter marking that indicates the outline of the vehicle by a continuous line.



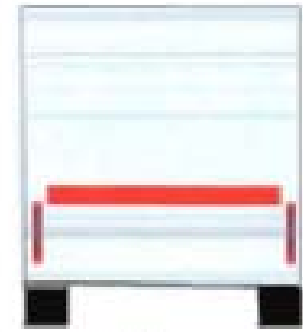
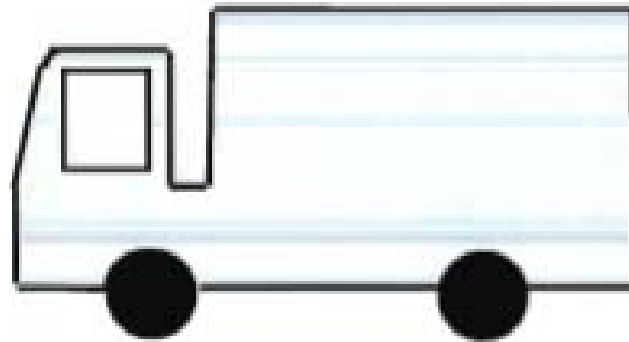
- **Distinctive Markings, Graphics:** Means additional markings intended to be placed within the counter marking, whose co-efficient of retro-reflection is essentially lower than the co-efficient of retro-reflective material used for conspicuity markings.



Goods Vehicles : For N1 and N2 (Below 7.5 tonnes) Vehicles – a line marking of 20 mm width tape at front (white) and rear(red) as shown in figure.

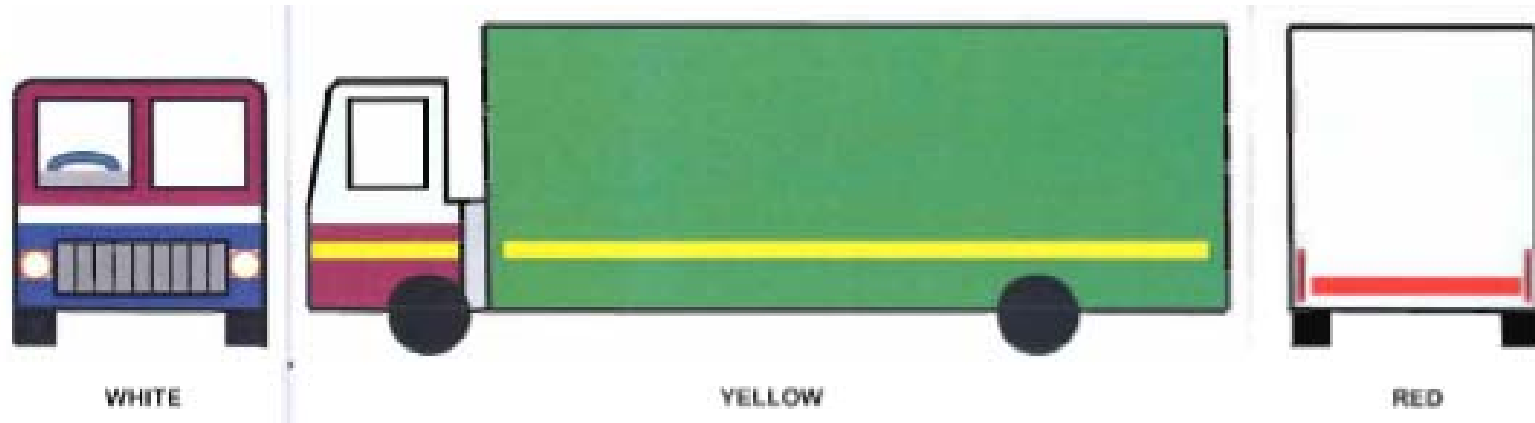


WHITE

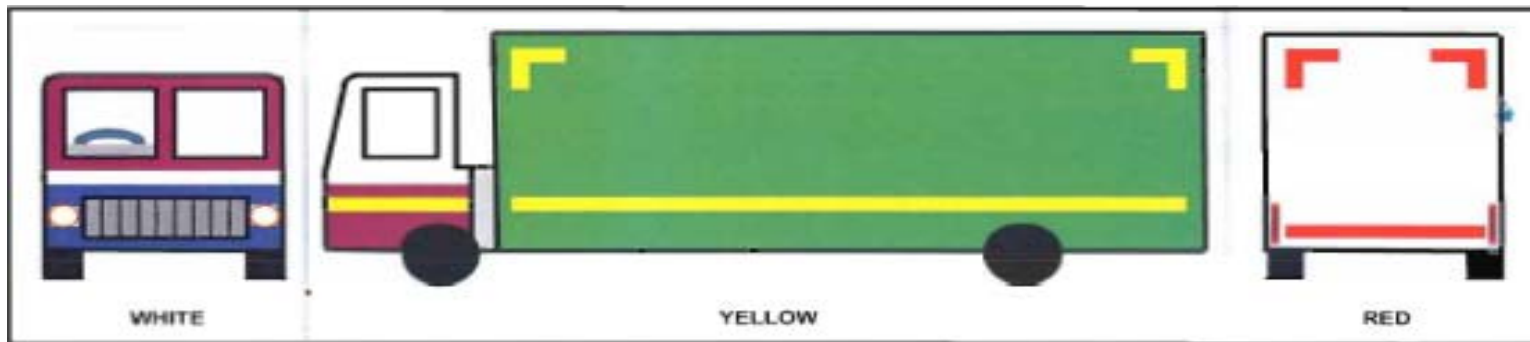


RED

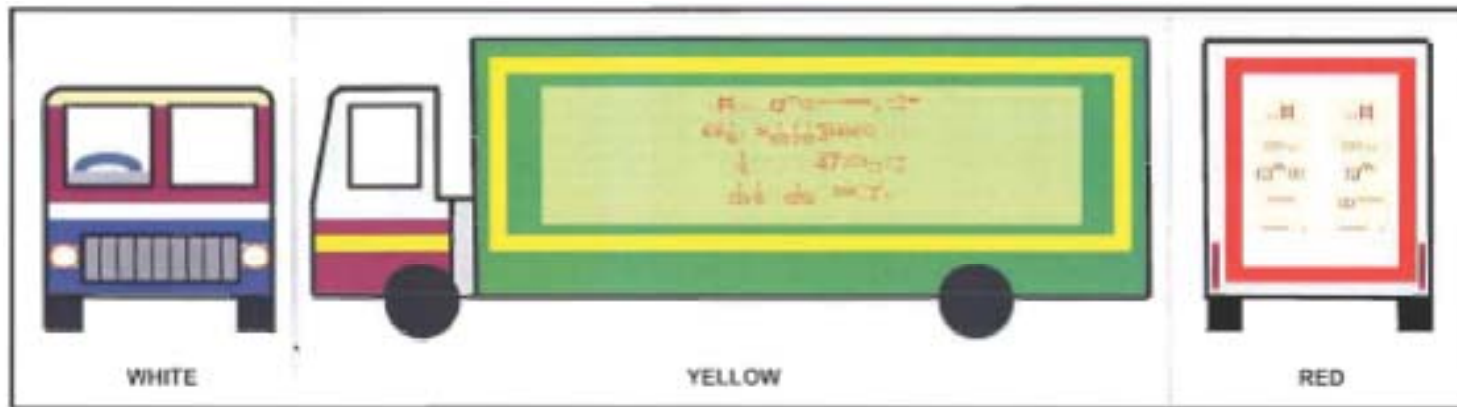
Goods Vehicles : For N2 (above 7.5 tonnes) & N3 vehicles – A line marking of 50 mm width tape at front (white) and full contour marking of 50 mm width tape at sides (yellow) and rear (red) as shown in figure.



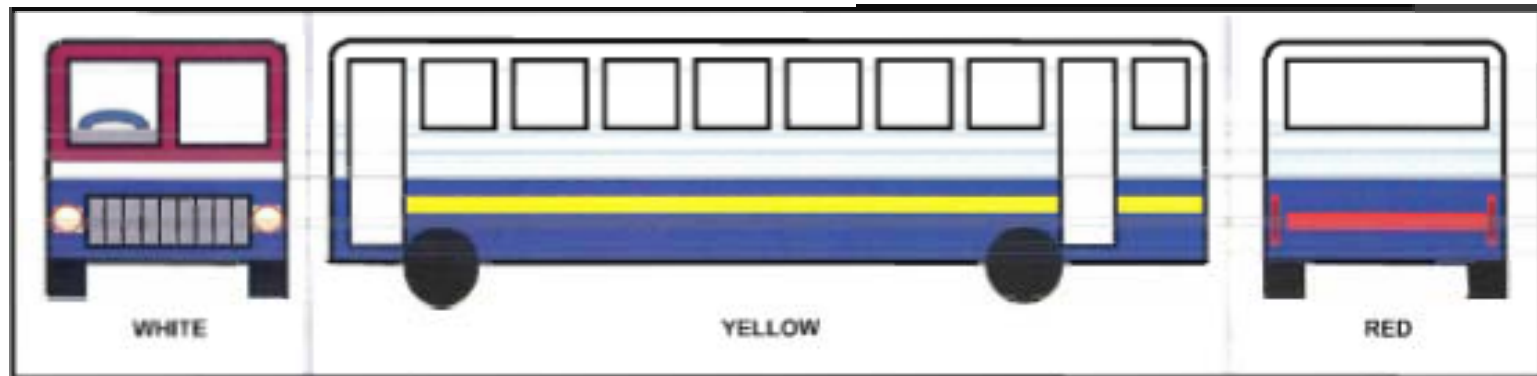
Goods Vehicles : For N2 (above 7.5 tonnes), & N3 vehicles – A line marking of 50 mm width tape at front (white) and partial contour marking of 50 mm width tape at sides (yellow) and rear (red) as shown in figure



Goods Vehicles : For N2 (Above 7.5 tonnes), & N3 vehicles – A line marking of 50 mm width tape at front (white) and full contour marking of 50 mm width tape at sides (yellow) and rear (red) as shown in figure



Passenger Vehicles : For M2 and M3 Vehicles – A line marking of 50 mm width tape across the width and the length of the vehicle at front (white), sides (yellow) & rear (red) as shown in figure.



NOTE

1. **Width of retro-reflective tape:**

1.1 For N1 and $3.5 \leq N2 < 7.5$ T categories of vehicles : 20 mm

1.2 Other category of vehicles : 50 mm

2. **Position :**

2.1 **Height :**

The placements of retro -reflective tape not below **250mm** and not above **1500mm** from ground level with exception up to **2100mm** in case height of 1500mm can not be complied with.

2.2 **Width and length:**

The minimum coverage of the retro -reflective tape shall be **80%** across the length of the vehicle on both sides and across the width of the vehicle in front and rear & Partial Contour / Full Contour marking as per AIS-090.

TATA 407

Rear Under-run Protection Device



TATA 909

Lateral Under-run Protection Device



TATA 909

Rear Under-run Protection Device



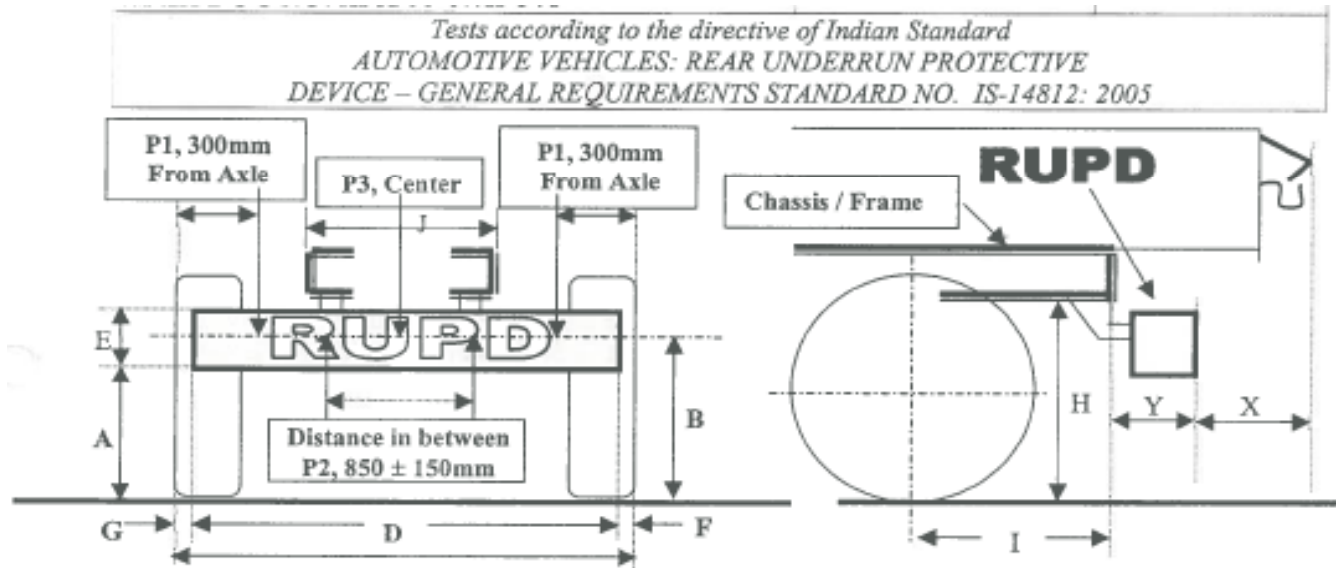
TATA 909

Lateral Under-run Protection Device



Rear Under-run protection device

Typical Checkpoints



Dimension to be measured	Identified by the parameter	Requirement (mm)	Measured value (mm)
Ground Clearance	A	550 Max.	475
Height Of Loading	B	600 Max.	535
Width of Rear Axle	C	N.A.	2220
Width of RUPD	D	N.A.	2100
Sectional Height of RUPD	E	100 min	120 *
Inboard value of guard from load Body (Rear Extremity)	X	N.A.	75
Guard Outboard value from Frame / Chassis	Y	N.A.	60
Distance between tire (outer edge) and RUPD, LH	F	100 max	60
Distance between tire (outer edge) and RUPD, RH	G	100 max	60
Chassis/Frame Rear Overhang	I	N.A.	2100
Chassis/Frame Ground Clearance (Rear End)	H	N.A.	760
Frame width	J	N.A.	900
Frame cross section details	--	N.A.	185X60X5

Lateral Under-run protection device

Typical Checkpoints

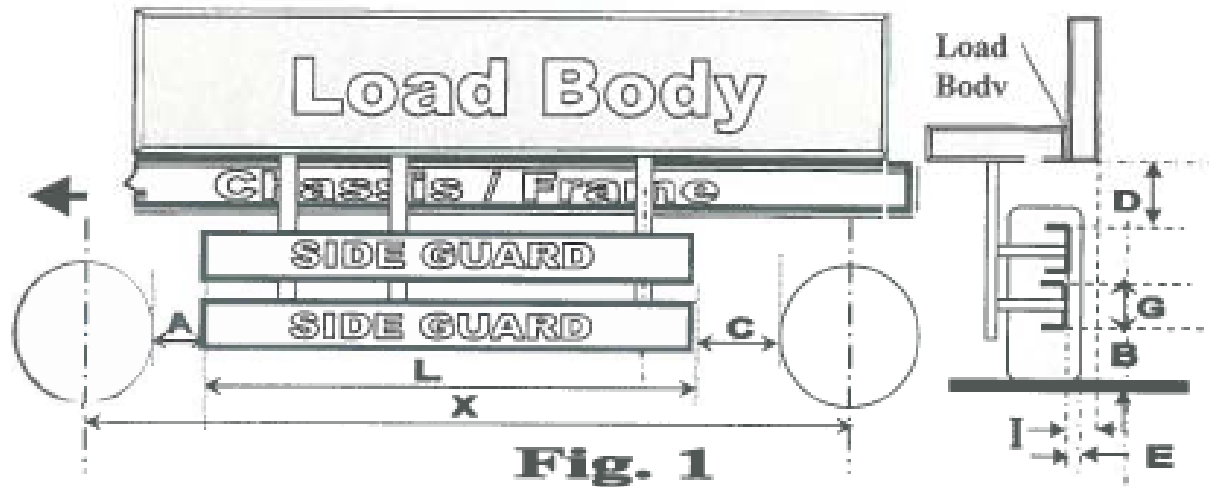


Fig. 1

Dimension to be measured (mm)	Parameter	Requirement (mm)	Measured Value (mm)
Ground Clearance of Device	B	550 max.	400
Sectional Height of Device	G	50 min	50
Longitudinal length of the Device	L	N.A.	2870
No .of vertical supports		N.A.	4
Wheel Base of Vehicle	X	N.A.	4200
Distance in between front Tyre and Device	A	300 max.	180
Distance in between rear Tyre and Device	C	300 max.	165
Distance between device and load body	D	350 max.	200
Distance Between the load body and Device (inboard)	I	120 max.	17
Distance Between the Tyre edge and Device	E	30 max.	25













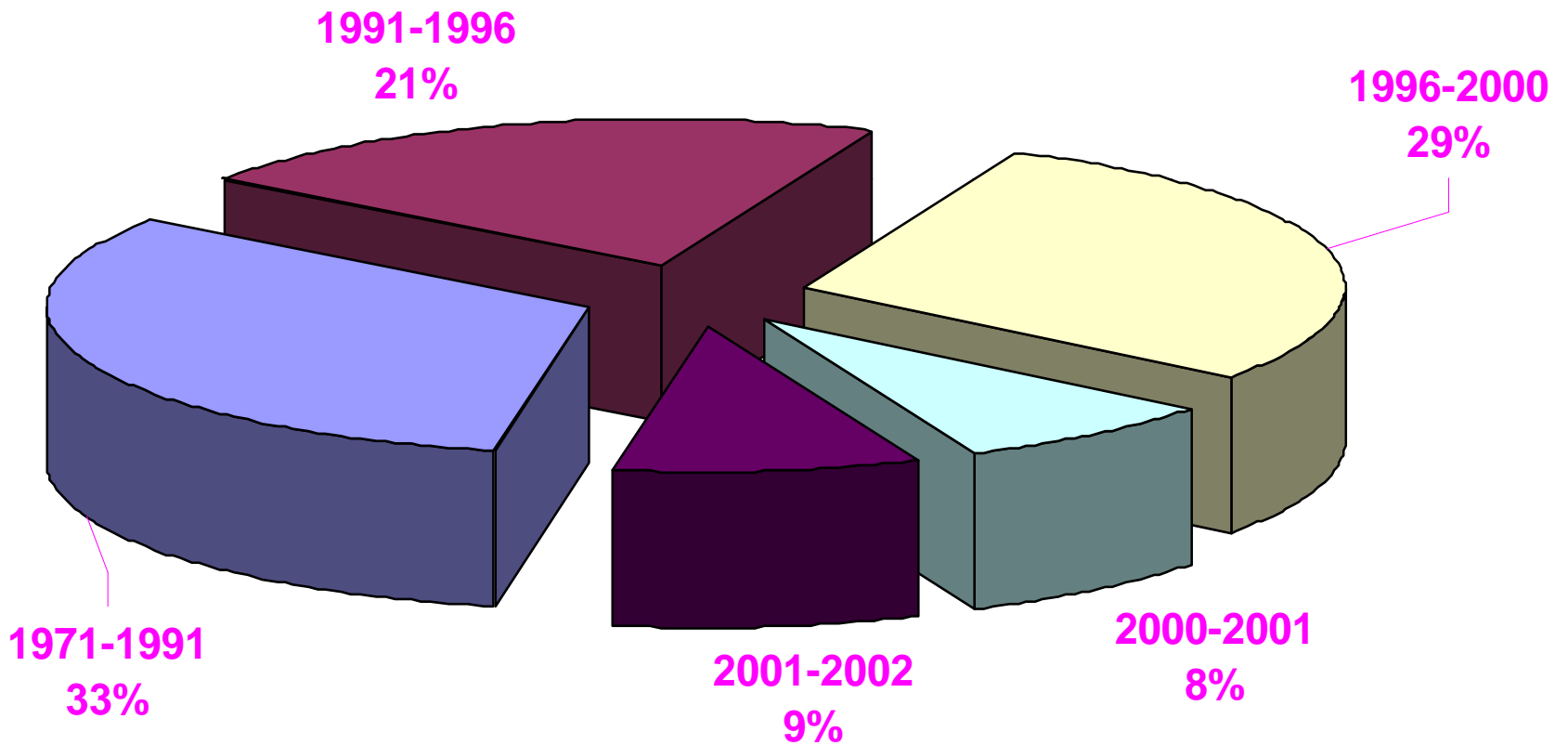




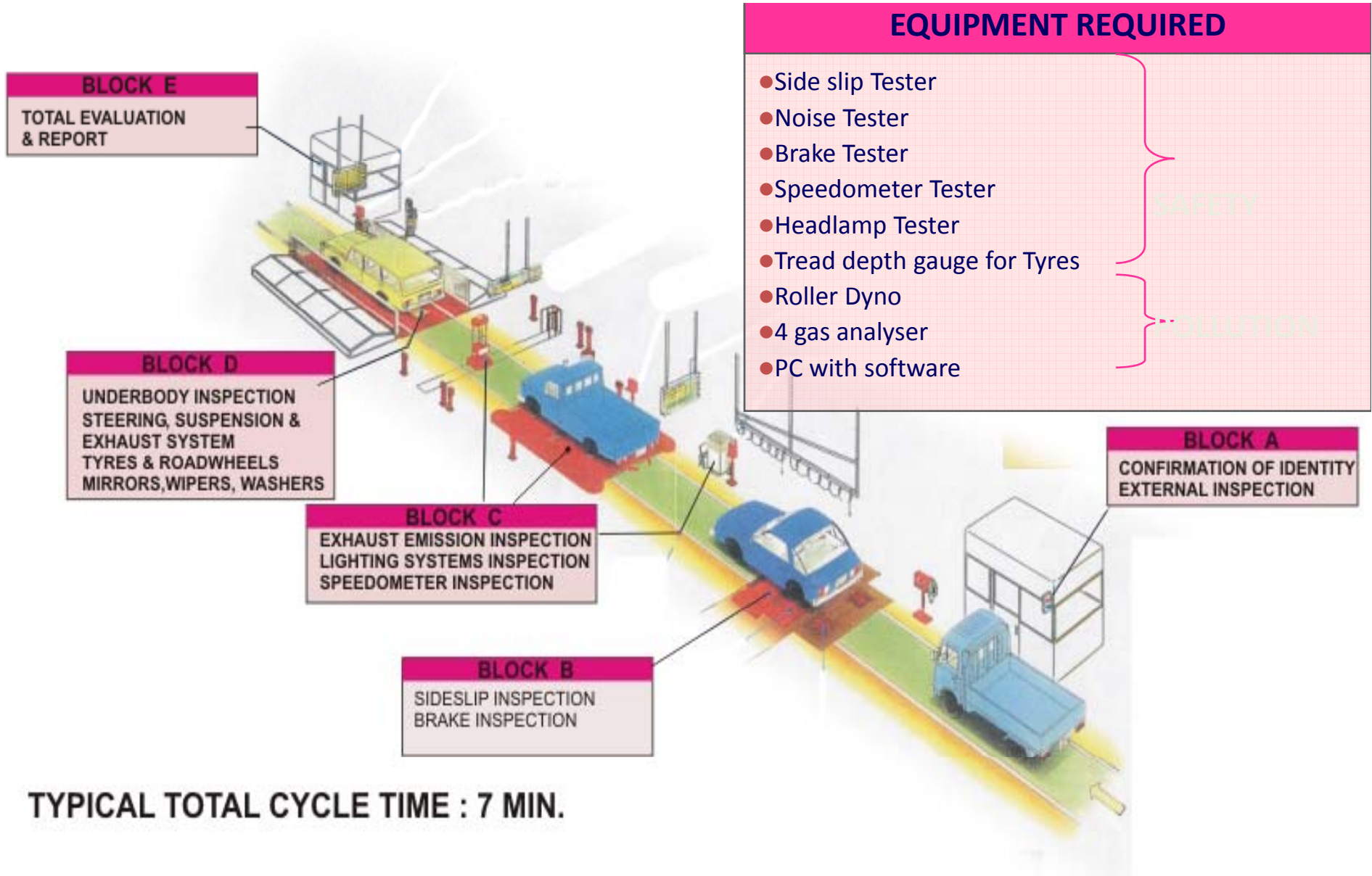
- Inspection
and
Certification

Vehicle Population - Vintage wise

Based on Vehicle Sales Data



TYPICAL FACILITY LAYOUT FOR INSPECTION & CERTIFICATION OF IN-USE VEHICLES



TYPICAL TOTAL CYCLE TIME : 7 MIN.

Automation of Safety & Emissions test for Fitness Certification (Burari, Delhi)

Automation of Safety & Emissions test for Fitness Certification (Burari, Delhi)

Automated Vehicle Inspection Unit at Burari, Delhi



Data
Noise
Emission
Speedometer
Brakes
Side-slip
Suspension
Joint Play
Headlights
CNG Safety

Automation of Safety & Emissions test for Fitness Certification (Burari, Delhi)

Inauguration of the facility by the Honorable Chief Minister & Honorable Transport Minister of Delhi on 1st July 2005



I&C Center – Burari (Delhi)



Two automated fitness testing lanes with computerised testing equipment:

one for auto rickshaw, taxis, RTVs and vehicle up to 3.5 tons, and

other for buses, trucks and other commercial vehicles





Heavy Duty Lane



Viewers Gallery

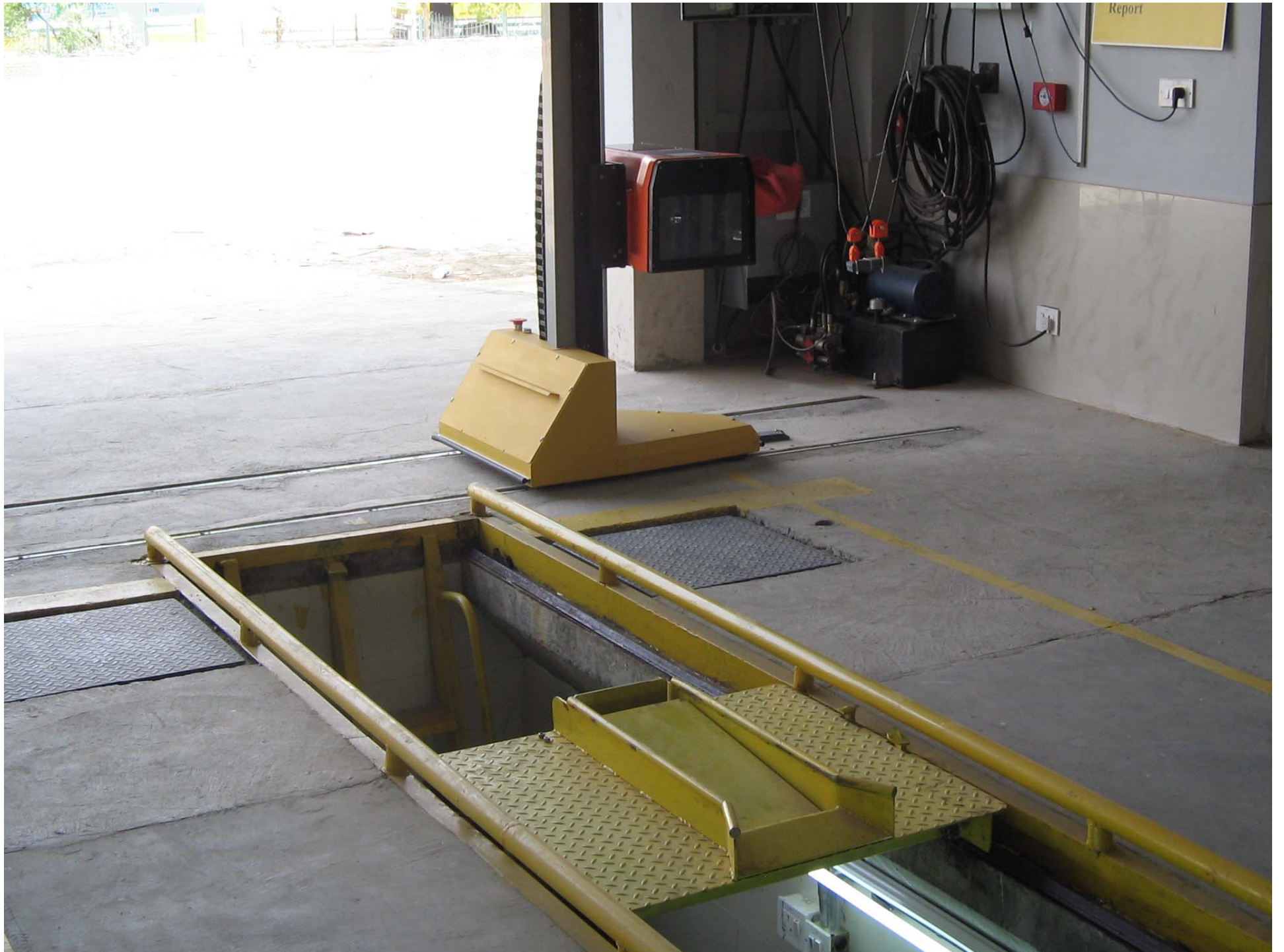














HD Lane View from Position 3

I&C Center – Burari (Delhi) :

Observations on Visual Inspection of Vehicles

- **Speed governor** missing & not functioning
- **Speedometer** not present or not functioning
- **Lambda sensor** missing
- Extensive **exhaust leak**
- **Headlamps** not properly focused & also lacks desired intensity
- **Front/rear indicator** either not functioning or covered with grill.



No Lambda Sensor



Exhaust Leak



Brake light with cover



Head lamp painted



Side indicator covered

I&C Center – Burari (Delhi) :

Observations on Visual Inspection of Vehicles

- **Parking brake** not functioning
- **Horn** not working and fitted with pressure horns – which are not allowed
- Only one **wiper** on driver side
- Improper **gearbox mounting** and **gearbox/differential oil leakage**.
- **Warning triangles** and **reflectors** absent



No wiper on codriver side



Improper fitment of wiper



Gear box oil leakage



Differential Oil leakage



Shock absorber not fit



Shock absorber not fitted

I&C Center – Burari (Delhi) :

Observations on Visual Inspection of Vehicles

- Abraded and worn out tyres
- Wheel nuts missing
- Shock absorber either missing or not properly mounted
- Gearbox cover missing
- Propeller shaft joints to differential not proper



Wornout tyre



Flat Tyres



Different size tyres



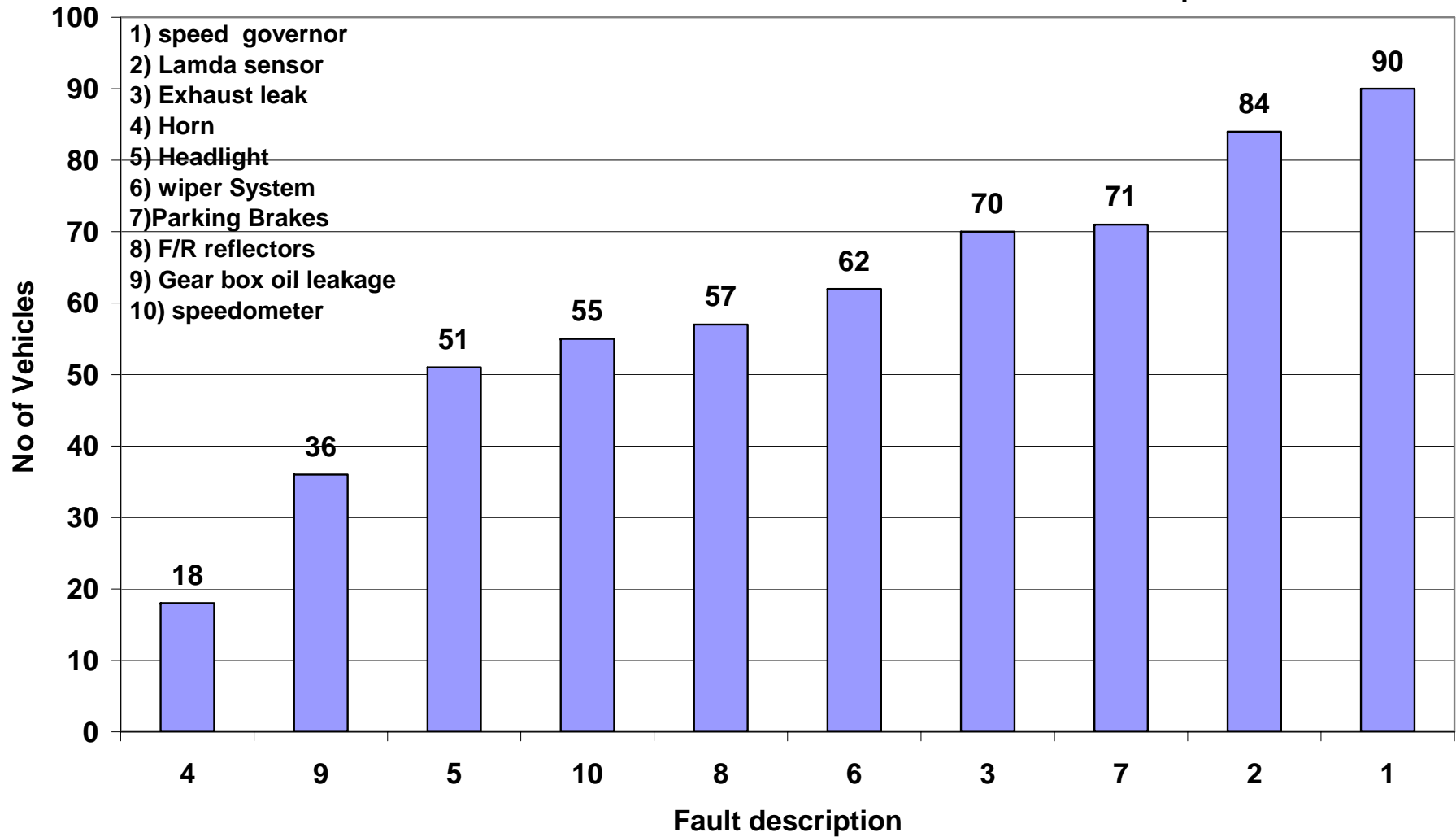
Missing Wheel nut



Broken leafs

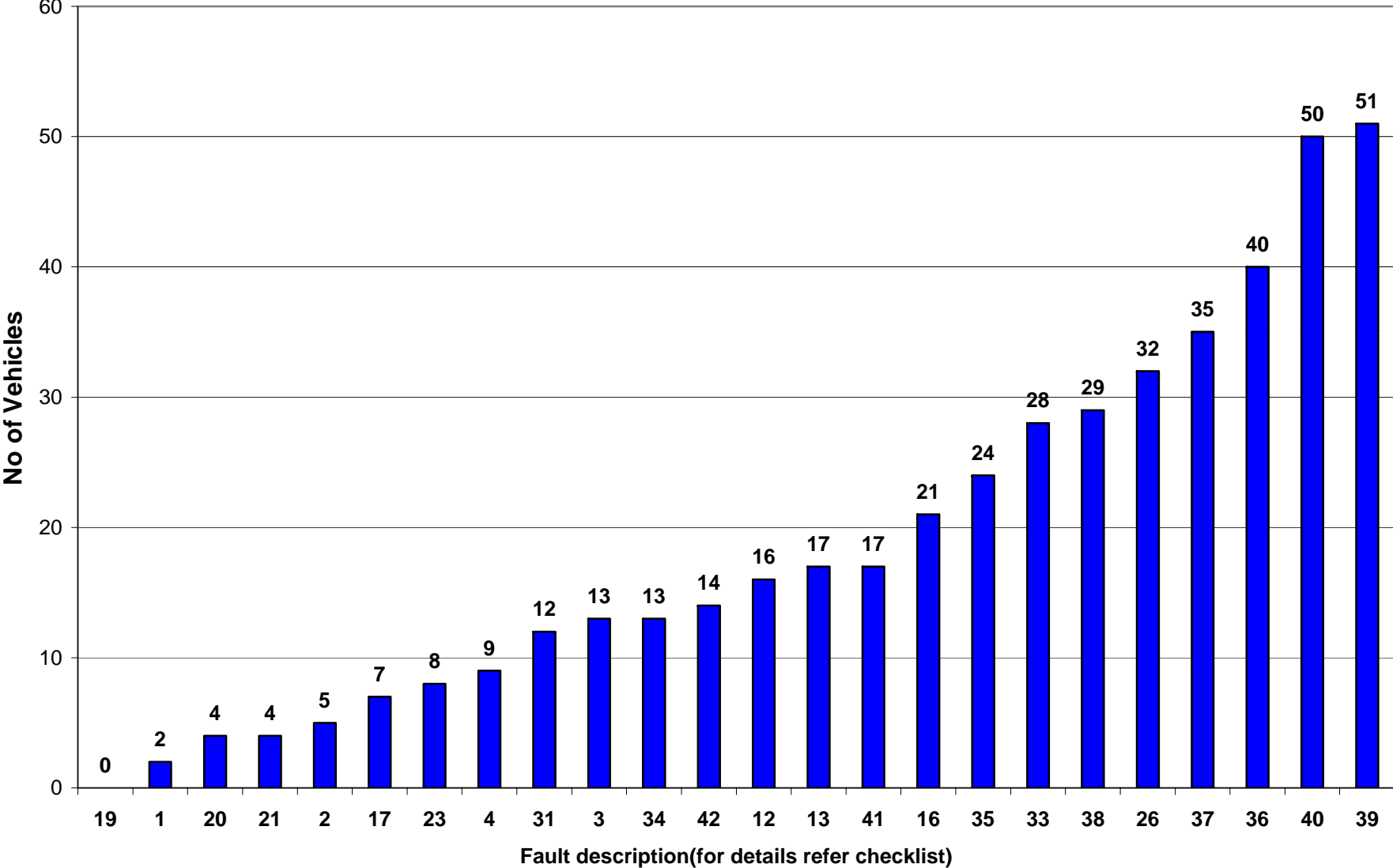
Visual Inspection

Total Sample Size 105



CNG Checks

Total Sample size: 57



	LCV Lane	HCV Lane
No. of Vehicles to be checked per hour / day	12	8
No. of Working Hours / day	8	8
No. of working Days / year	300	300
Operating efficiency	75%	75%
Annual inspection capacity of a lane	21600	14400

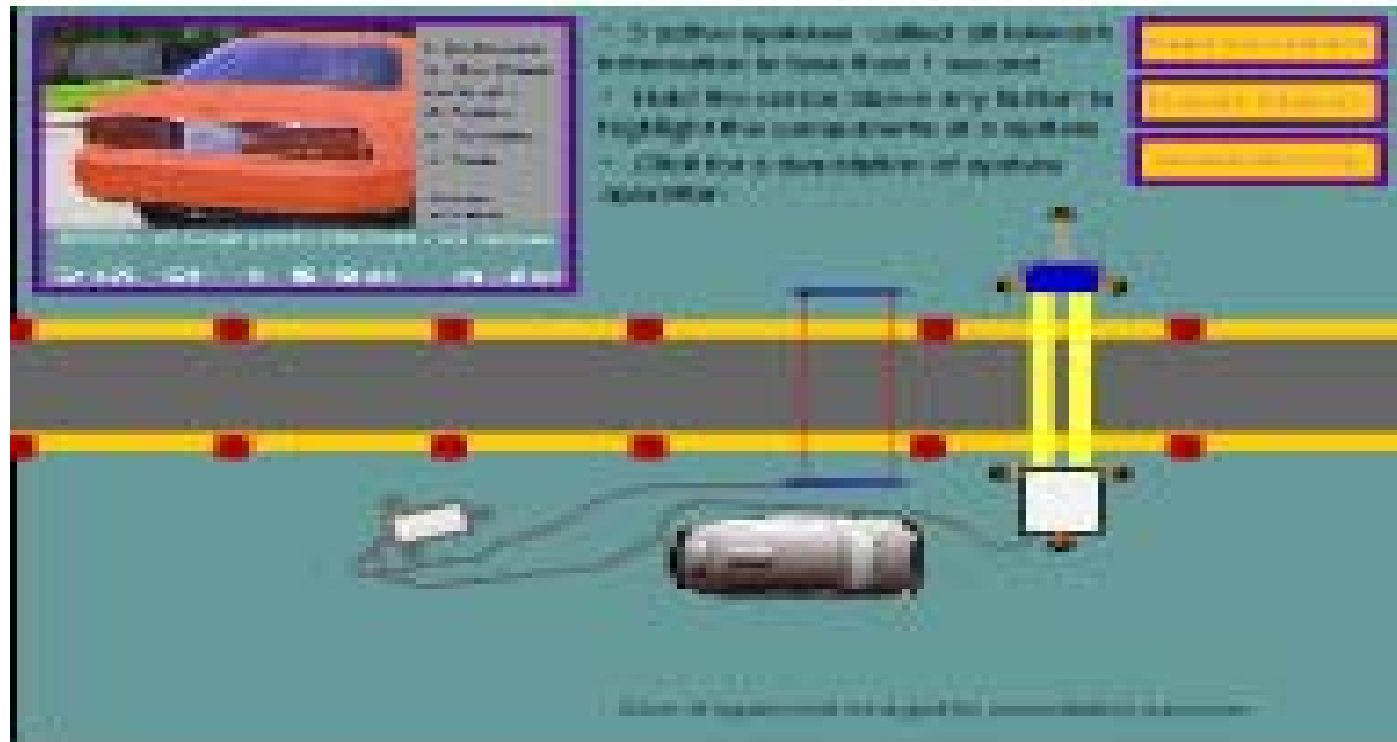
TASKS AHEAD

- Remote Sensing measures pollution from all types of vehicle running on all fuel types like petrol, diesel, CNG, LPG.
- Several Lakhs of readings can only provide a true representation of vehicle plying on road of any city and can help in arriving at effective policy decision
- By remote sensing the make, model year of those 20% gross polluters is known who usually contribute to 80% of pollution.
- Remote sensing being a mobile set-up can be deployed at various locations in a city and in different cities of a State to measure pollution from vehicles to arrive at policy decisions to control vehicular emissions.
- Picture of vehicle with license plate helps in identifying vehicles from outside City / State and helps in enforcing security in the city as well as transfer of registration of vehicle if required to State Transport Department.
- Details from remote sensing helps traffic department and police to identify faulty & fake number plates.
- Pictures of vehicles also help in enforcing overloading of vehicles with passengers and /or goods which affect road safety.

Remote Sensing Technology (continued)

Adapted for on-Road

1. Hardware: www.rsd-remotesensing.com



Sites in Pune & Delhi



Retrofitment Programme

- In US densely populated cities in NE, emission from diesel vehicles accounted for 33% of all NOx and 80% of PM emissions.
- Retrofit programme help in bridging the time gap until the new low emission vehicle models are able to penetrate the existing fleet.
- Prerequisite conditions for retrofitment programme are-engine condition; vehicle integration; low sulfur fuel and maintenance regime for in use vehicle fleet.
- During the last decade number of countries have successfully implemented the retrofitment programmes.
- These countries include ; USA (About 160,000 diesel vehicles); UK(14000 vehicles); France (5000 vehicles);Switzerland(10,000 Vehicles);Sweden (4000 truckes);Hongkong(50,000 catalyts);South korea(500000Vehicles) etc.

Retrofitment options

- **DPFs:** (Diesel Particulate Filters) Reduce particulate matter from exhaust by mechanical filtering. It also reduces the size of particles in a uniform manner i.e. both small and large particles are reduced. For regeneration catalyst are coated on the surface of the filter which reduces ignition temperature to oxidise accumulated particulate matter.
- **DOCs:** (Diesel Oxidation Catalyst) Oxidises CO and HC and liquid hydro-carbon adsorbed on carbon particles called soluble organic fractions (SOFs)
- **SCRs:** (Selective Catalytic Reduction) converts NO_x into N₂ and O₂. Reduction in NO_x is around 75-90%. HC and PM also get reduced. It also reduces the odour produced by diesel engine and diesel smoke. In mobile source we normally use aqueous urea solution i.e. AdBlue. It is an ammonia based reducing agent injected in the exhaust in downstream

Retrofitment options(Cont.)

- **EGR:** (Exhaust gas recirculation) system works by recirculation of exhaust gases back into the intake stream which cools the combustion process and there by reduces the NO_x formation.
- **CRTs:** (Continuously Regenerating Traps) made by Jhonson Matthey. It uses DOC alongwith DPF. DOC reduces CO and HC while DPF burns particulates.

- Reduces PM by 70 to 90%. If catalyst is coated

Reduction in pollutants

- **DPFs:** Reduces PM by 70 to 90%. If catalyst is coated HC & Co is also reduced.
- **DOCs:** PM reduces by 20 to 50%: HC by 50 to 90%: CO by 10 to 90%.
- **SCRs:** Reduces NOx by 60 to 90%: PM by 0 to 50%: HC by 50 to 90%: CO by 50 to 90 %.
- **EGRs:** Reduces NOx by 50 %.
- **CRTs :** Reduces PM by 80%: HC by 92%: CO by 94%

Different retrofit devices



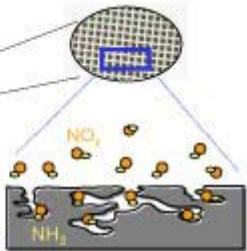
Particle filters



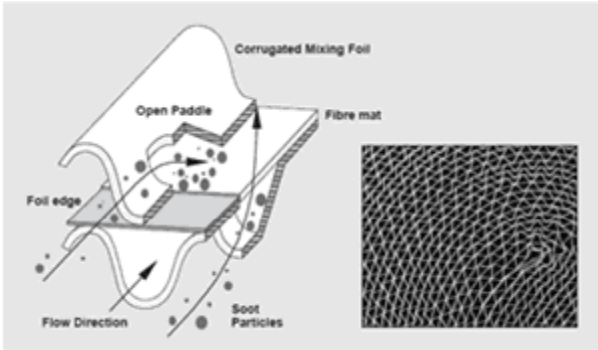
SCRs with ureas injection



AdBlue



SCRs



Diesel Oxidation filters



Particulate traps



Prince Michael International Road safety Award

Barcelona Award for Automotive Innovation



SAE International Award for introduction of CNG in Delhi

Golden Peacock National Award for Quality



**THANKS
FOR
YOUR
Patience**