



Asia-Pacific



Symposium on  
Public  
Transportation in  
Indian Cities with  
Special focus on  
Bus Rapid Transit  
(BRT) System

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## Review of Requirements and Specifications for Urban Buses in Indian Scenario

*Raju, S.,*

*ARAI, Pune*



# Bus Industry in India

- This decade is 'Bus' decade in India.
- With growth in Indian economy and urban agglomeration, urban transport is chaotic, polluting and accident prone.
- Multi-modal transport systems in metros.
- Funding programs - World Bank, ADB, JNNURM, etc.
- Bus is considered more environmental friendly than metro when looked from global emissions.

# Bus Industry in India

- Bus production in India and World

*(Figures in Thousands)*

	2007	2008
Asia-Oceania	424	503
Europe	90	97
America	68	70
World production	587	703
China	344	447
India	44	44

- The production in India in 2009 is only around 45000 despite JNNURM's stimulus package for >15000 buses.
- MoUD estimate of urban bus requirement by 11<sup>th</sup> Five Year Plan is 1,50,000 buses.

• Sources : OICA, SIAM.

# Bus Industry in India

- Majority of buses built on drive-away truck chassis by large no. of bus body builders (>6000) in unorganized sector.
- 6/7 body builders and recently OEMs in organized sector.
- Capacity of the bus body building industry is very limited
- Most of the designs developed by experience – not much of engineering – only recently some designs of semi-low, low floor of imported origin evolving.
- Need for appropriate Indian designs for various applications.
- Need for cost effective solutions – both capital and operating and affordable public transport.

# Bus Body Code

- Till recently, no separate mandatory requirements for bus body other than required for truck chassis.
- Prepared over 7-8 years by CMVR-TSC submitted as AIS-052 to MoRTH in September 2001.
- Notified in 2007. Implementation date yet to be announced.
- Covers classification, dimensions, strength, safety and functional requirements, all the features and components.
- Separate classification for city buses – NDX/SDX/DLX/ ACX
  - Micro (12)/Mini (13-22) /Midi (23-34) / Standard (35-70)/ High-capacity (>70).

# Bus Body Code

- However, this is the first step and covers only basic minimum requirements.
- Expected to be implemented in 2010/2011.
- MoUD's urban bus specifications brought out in 2008 -
  - based on Bus Body Code
  - elaborate ITS requirements
  - many cities have floated tenders asking for more advanced features
- How much is implemented in the supplies under JNNURM?

# BRTS - Vehicle selection

- Affects overall levels of service viz. speed, reliability, comfort, capacity and cost.
- Should match with other elements of the system viz. running ways, bus station design, service plan, ITS, etc.
- Major factors for vehicle selection :
  - capacity – type of bus – Mini/Standard/High capacity
  - Operating efficiency – no., size and location of doors
  - floor height (low/semi low/normal)
  - NVH – position and type of engine
  - Choice of fuel – diesel / CNG – cylinder location
  - Aesthetics and comfort

# **BRTS (DTC/AMC/PMPML) – Main features**

▪ **12 m long buses with capacity 80-100 (seating 30-50) at peak time, unlike developed countries (50-60).**

▪ **Low (350-400 mm) /semi-low (800-850 mm) floor**

**\*Integral/drive-away chassis**

**\*high ULW, 10.5 – 13 t**

▪ **Air suspension with kneeling**

▪ **Engine power (150-300 HP)**

▪ **Automatic/Manual transmission**

Cost – 50 – 70 lakhs for low floor  
30 – 40 lakhs for semi-low floor  
20 – 25 lakhs for normal  
Compared to 1 – 5 crore of imported buses.

# Issues

- With 100 passengers, GVW goes to 18 – 21 t as against permissible GVW of 16.2 t only
- Road damage increases exponentially with GVW.
- Buses with an ULW <10 t or 3 axles
- Why low floor? (Available is only for 40-50 % of area)
- Why all buses low floor?
- Why air suspension? For better ride, BRTS roads can be made better and maintained properly (all the city roads also)
- Advanced ITS requirements – where are the suppliers?

# Suggestions

- **A mix of different capacity buses like Mini (13-22), Midi (23-34), Standard (30-50) and high capacity (articulated or trailer buses with a tractor and use them effectively depending upon the traffic capacity.**
- **A mix of different types : semi-low and low floor buses (catering to handicapped and aged) at different frequencies.**
- **Air suspension buses with kneeling for handicapped and aged at specified intervals (can be used during peak hours)**

# Suggestions for low ULW

- **Use of alternate materials**
  - use of higher strength material
  - use of Aluminium instead of steel wherever possible.
  - use of safe but lower thickness glass
  - use of lower metal thickness/composites for floor/roof
  - use of optimized seats
  - roof mounted composite CNG cylinders (weight reduction up to 1 t).
  - overall optimization of the complete structure

# Suggestions for lower cost

- **Alternate suspension such as WEVELLER with better comfort than conventional**
- **Different capacity power plants with automatic/semi-automatic/manual transmission**
- **Design buses with 25 % low floor and rest with semi-low floor / normal floor**
- **Semi-low/low floor bus with front engine and customized chassis frame.**

# Selection of Appropriate Vehicle Technology - Issues

- **ULBs/STUs have good operating experience, but**
- **require good knowledge of :**
  - **emerging technologies including their mixes**
  - **effective procurement of modern technology items**
  - **effective operation of modern technology buses**
- **Need to interact with traffic planning experts to arrive at optimal vehicle technology**
- **Need to have experts to define the vehicle requirements and specifications**
- **To get what is required THAN what is supplied**

# Selection of Appropriate Vehicle Technology - Suggestions

- **Make use of multi-disciplinary committee of experts on city and traffic planning, environment, vehicle technology, operation, etc. to arrive at an appropriate multi-modal transport system and also define appropriate vehicle technologies.**
- **Expert vehicle technology consultant/firm to take care of vehicle procurement starting from tender specifications to acceptance and training**
- **Adequate training of the operators on modern technology bus by the suppliers – both in operation and maintenance**

# Better value for Money : Issues

• In the modernization of urban transport, effective utilization of funds can be achieved by :

-better traffic planning

-better selection of vehicle technology

-better operation of systems

▪ Better vehicle technology does not imply import of vehicles or vehicle designs but, deciding appropriate vehicle technology and manufacturing locally.

# Better value for Money : Suggestions

- **Setting up of a Committee to study and recommend appropriate vehicle technology options for Indian urban transport.**
- **A detailed but quick study of the experiences gained by the BRTS and JNNURM cities wrt vehicle technology.**
- **Arriving at suitable recommendations for 5 or 6 different classes of buses along with detailed specifications.**
- **Detailed design and development and proving of these buses along with selected and interested bus body manufacturers**

# Better value for Money :

## Suggestions

- Simultaneously arriving at good manufacturing and quality control practices with selected bus body builders.
- Making these designs and the above practices available to proven and promising bus body manufacturers.
- Recommending technical consulting organizations for procurement to ULBs / STUs
- Setting up a Supervisory Committee to ensure that the ULBs / STUs achieve the end objective of having 'value for money' buses and suitable mechanisms are in place for proper operation and maintenance.

# Better value for Money :

## Suggestions

- The Committee may be set up by MoUD being the main stakeholder and may consist of :
  - Traffic Planning experts e.g. TRIPP, CEPT, DIMTS, CIRT
  - Vehicle technology experts e.g. ARAI, OEMs and leading bus body builders.
  - End users e.g. selected ULBs/STUs
  - Manufacturing consultants e.g. KUKA, TAL,
  - Foreign organizations with experience in urban transport e.g. TRL, ITDP, etc.
  - Consulting firms / Consultants in urban transport.

# Better value for Money : Suggestions

- This should be a very tight time bound program of 18-24 months.**
- The Committee should be able to also offer interim solutions to the on-going projects in various cities wherever required and possible.**
- This will also provide an opportunity for progressive thinking bus body builders in unorganized sector to get access to technology and manufacturing to become competitive and survive in the growing global bus market.**

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