Optimization of Urban Transport with “True Blue” Mini Buses

- Section I: Urbanization & Urban Transport a Global Perspective
- Section II: Urbanization & Urban Transport in the Indian Context
- Section III: Role of Mini Buses & Challenges in Urban Transport
- Section IV: Product Introduction Module – “Force Traveller Smart Citi Bus” a True Blue Mini Bus
- Key Takeaways for Open House Discussions
Section – I Urbanization & Urban Transport a Global Perspective
India is expected to add 404 Million Urban Dwellers as against 292 Million expected by China in next 25 Years

- 54% of the global population is Urban in 2014 as against 30% in 1950
- It is expected that 66% of the population will be Urban by 2050

Asia and Africa are urbanizing at a Very High Rate
- Asia is expected to Host 50% of the Worlds Urban Population
- India, China and Nigeria – 3 Countries to account for 37% of the growth from 2014-2050
• Fastest growing Urban Agglomerations: - Medium Sized Cities with 500,000 to 1 Mn Population
• Sizeable Urban Agglomerations: - with less than 500,000 people

• 12.5% of the world urban dwellers live in Megacities (with populations more than 10 Million)
• 50% of the Urban Dwellers are living in habitats of less than 500,000 population

• The proportion of urban dwellers in habitats less than 500,000 is expected to shrink but still these habitats will house 45% of the world's urban population

India may move in any of the directions of the developed world with increase in urbanization.

In any case the role of Mini Buses cannot be overlooked.
Section – II Urbanization & Urban Transport in the Indian Perspective
Majority of the Urban Agglomerations in India are below 0.5 Mn Population

- 2 Megacities with population more than 10 Mn viz Mumbai & Delhi
- 3 Large Cities with Population 5-10 Mn viz Ahmadabad, Hyderabad & Bangalore
- 41 Medium Sized Cities with Population 1-5 Mn
- 43 Urban Agglomerations between 0.5 Mn – 1 Mn
- 399 Agglomerations with population < 0.5 Mn
▪ Post JnNURM I, the fleet size of most of the CTUs increased.
▪ However, the Occupancy Ratios of 4 Cities fell indicating either excess buying or buying of buses with higher capacity.
- Total Funding allocation for 10,000 Buses

- Only 4% (437 Nos) were allocated for Mini Buses

- Technical regulations under UBS II made features like Air Brakes, Automatic Transmission & Air Suspension which were inherently required only for bigger (12m) buses, mandatory for Mini Buses (where it was not required).
- The free finalization not only increased the acquisition cost but also the maintenance cost of the buses.

- Ultimately, procurement happened for 148 Nos Mini Buses only

- The importance of Mini Buses in improving Utilization Factor, reducing initial cost & improving operating efficiency was not fully realized
- Actually, Mini Buses have a Big Role to play in the Modern Urban Transport Scenario
India is expected to follow the global trend of urbanization with focus on Urban Agglomerations of 1-5 Million and Small Cities with less than 0.5 Mn agglomerations.

For Such Smaller Urban Towns Mini Buses will have a greater role to play for Urban Transport.
Section – III Role of Mini Buses in Modern Urban Transport
Role of Mini Buses in Modern Urban Transport

<table>
<thead>
<tr>
<th>To be a principal Source of Transport for Small Urban Agglomerations (Population &lt; 0.5 Mn)</th>
<th>Feeder Routes for Mega Cities (with Population &gt;10 Mn) with Strong Metro Rail Networks</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Based on Load Factors and Fleet Utilization, optimum Fleet Planning with Right Size of Buses</td>
<td>• For the very successful DMRC, the last mile connectivity by metro feeder is only 6%</td>
</tr>
<tr>
<td>• Will help in increasing Profitability of STUs or Public Operators</td>
<td>• Fleet Planning of Metro Feeders is a must</td>
</tr>
</tbody>
</table>

Ride Sharing Services with Bus Aggregators

| • Bus Aggregators can help on Demand Transportation through Technology | • Bangalore, Hyderabad, Nagpur etc are other cities with Upcoming Metros |
| • Will help in optimizing the routes and incentivization of Drivers | |

Improved Connectivity from City Center to Suburbs

| • Mini Buses will play an important role in developing Suburbs by helping them connect to Central Business Districts | |

- Role of Mini Buses in Urbanized Transport cannot be overlooked
Section – IV Product Introduction of a “True Blue Mini Bus”- The Force Traveller Smart Citi Bus
© Stakeholder Expectation

- Get hassle free, quick, clean & frequent services
- Affordable cost of travelling
- Experience international safety & security standards
- Comfort, less Fatigue and Convenience

• Provide best in class service to commuters inline with rules defined by Government of India
• Maintaining higher profits margins & least operating cost

- Cater to the needs of the stakeholders
- Ensure Passenger Safety & Comfort
- Conserve Natural Resources
- Should meet the latest regulations as specified by various authorities

- Pollution free environment
- Safer transport system which ensures safety of passengers & pedestrians
- Reduce the fatalities due to road accidents

- Get hassle free, quick, clean & frequent services
- Affordable cost of travelling
- Experience international safety & security standards
- Comfort, less Fatigue and Convenience

- Pollution free environment
- Safer transport system which ensures safety of passengers & pedestrians
- Reduce the fatalities due to road accidents

- Get hassle free, quick, clean & frequent services
- Affordable cost of travelling
- Experience international safety & security standards
- Comfort, less Fatigue and Convenience

- Pollution free environment
- Safer transport system which ensures safety of passengers & pedestrians
- Reduce the fatalities due to road accidents

- Get hassle free, quick, clean & frequent services
- Affordable cost of travelling
- Experience international safety & security standards
- Comfort, less Fatigue and Convenience

- Pollution free environment
- Safer transport system which ensures safety of passengers & pedestrians
- Reduce the fatalities due to road accidents

- Get hassle free, quick, clean & frequent services
- Affordable cost of travelling
- Experience international safety & security standards
- Comfort, less Fatigue and Convenience

- Pollution free environment
- Safer transport system which ensures safety of passengers & pedestrians
- Reduce the fatalities due to road accidents

- Get hassle free, quick, clean & frequent services
- Affordable cost of travelling
- Experience international safety & security standards
- Comfort, less Fatigue and Convenience

- Pollution free environment
- Safer transport system which ensures safety of passengers & pedestrians
- Reduce the fatalities due to road accidents

- Get hassle free, quick, clean & frequent services
- Affordable cost of travelling
- Experience international safety & security standards
- Comfort, less Fatigue and Convenience

- Pollution free environment
- Safer transport system which ensures safety of passengers & pedestrians
- Reduce the fatalities due to road accidents

- Get hassle free, quick, clean & frequent services
- Affordable cost of travelling
- Experience international safety & security standards
- Comfort, less Fatigue and Convenience

- Pollution free environment
- Safer transport system which ensures safety of passengers & pedestrians
- Reduce the fatalities due to road accidents

- Get hassle free, quick, clean & frequent services
- Affordable cost of travelling
- Experience international safety & security standards
- Comfort, less Fatigue and Convenience

- Pollution free environment
- Safer transport system which ensures safety of passengers & pedestrians
- Reduce the fatalities due to road accidents

- Get hassle free, quick, clean & frequent services
- Affordable cost of travelling
- Experience international safety & security standards
- Comfort, less Fatigue and Convenience

- Pollution free environment
- Safer transport system which ensures safety of passengers & pedestrians
- Reduce the fatalities due to road accidents

- Get hassle free, quick, clean & frequent services
- Affordable cost of travelling
- Experience international safety & security standards
- Comfort, less Fatigue and Convenience

- Pollution free environment
- Safer transport system which ensures safety of passengers & pedestrians
- Reduce the fatalities due to road accidents

- Get hassle free, quick, clean & frequent services
- Affordable cost of travelling
- Experience international safety & security standards
- Comfort, less Fatigue and Convenience

- Pollution free environment
- Safer transport system which ensures safety of passengers & pedestrians
- Reduce the fatalities due to road accidents

- Get hassle free, quick, clean & frequent services
- Affordable cost of travelling
- Experience international safety & security standards
- Comfort, less Fatigue and Convenience

- Pollution free environment
- Safer transport system which ensures safety of passengers & pedestrians
- Reduce the fatalities due to road accidents

- Get hassle free, quick, clean & frequent services
- Affordable cost of travelling
- Experience international safety & security standards
- Comfort, less Fatigue and Convenience

- Pollution free environment
- Safer transport system which ensures safety of passengers & pedestrians
- Reduce the fatalities due to road accidents

- Get hassle free, quick, clean & frequent services
- Affordable cost of travelling
- Experience international safety & security standards
- Comfort, less Fatigue and Convenience

- Pollution free environment
- Safer transport system which ensures safety of passengers & pedestrians
- Reduce the fatalities due to road accidents

- Get hassle free, quick, clean & frequent services
- Affordable cost of travelling
- Experience international safety & security standards
- Comfort, less Fatigue and Convenience

- Pollution free environment
- Safer transport system which ensures safety of passengers & pedestrians
- Reduce the fatalities due to road accidents

- Get hassle free, quick, clean & frequent services
- Affordable cost of travelling
- Experience international safety & security standards
- Comfort, less Fatigue and Convenience

- Pollution free environment
- Safer transport system which ensures safety of passengers & pedestrians
- Reduce the fatalities due to road accidents

- Get hassle free, quick, clean & frequent services
- Affordable cost of travelling
- Experience international safety & security standards
- Comfort, less Fatigue and Convenience

- Pollution free environment
- Safer transport system which ensures safety of passengers & pedestrians
- Reduce the fatalities due to road accidents

- Get hassle free, quick, clean & frequent services
- Affordable cost of travelling
- Experience international safety & security standards
- Comfort, less Fatigue and Convenience

- Pollution free environment
- Safer transport system which ensures safety of passengers & pedestrians
- Reduce the fatalities due to road accidents

- Get hassle free, quick, clean & frequent services
- Affordable cost of travelling
- Experience international safety & security standards
- Comfort, less Fatigue and Convenience

- Pollution free environment
- Safer transport system which ensures safety of passengers & pedestrians
- Reduce the fatalities due to road accidents

- Get hassle free, quick, clean & frequent services
- Affordable cost of travelling
- Experience international safety & security standards
- Comfort, less Fatigue and Convenience

- Pollution free environment
- Safer transport system which ensures safety of passengers & pedestrians
- Reduce the fatalities due to road accidents

- Get hassle free, quick, clean & frequent services
- Affordable cost of travelling
- Experience international safety & security standards
- Comfort, less Fatigue and Convenience

- Pollution free environment
- Safer transport system which ensures safety of passengers & pedestrians
- Reduce the fatalities due to road accidents

- Get hassle free, quick, clean & frequent services
- Affordable cost of travelling
- Experience international safety & security standards
- Comfort, less Fatigue and Convenience

- Pollution free environment
- Safer transport system which ensures safety of passengers & pedestrians
- Reduce the fatalities due to road accidents
Introducing the all New Traveller Smart Citi Bus

- Option 1: Traveller 14+D with BSIII/BS IV Diesel, BS IV CNG Options
- Option 2: Traveller 21+D with BS III/BS IV Diesel, BS IVCNG Options

Meeting the latest MOUD UBS II Norms

Upgradable to BS V & BS VI Standards
Introducing the all New Traveller Smart Citi Bus

<table>
<thead>
<tr>
<th>TRAVELLER : 21+D (Also available in 14+D)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model</strong></td>
</tr>
<tr>
<td>Dimensions (mm)</td>
</tr>
<tr>
<td>Overall Length</td>
</tr>
<tr>
<td>Overall Width</td>
</tr>
<tr>
<td>Overall Height</td>
</tr>
<tr>
<td>Wheelbase</td>
</tr>
<tr>
<td>Seating Capacity</td>
</tr>
<tr>
<td>GVW (kgs)</td>
</tr>
<tr>
<td><strong>Engine</strong></td>
</tr>
<tr>
<td>Emission</td>
</tr>
<tr>
<td>Model</td>
</tr>
<tr>
<td>Type</td>
</tr>
<tr>
<td>Displacement</td>
</tr>
<tr>
<td>Power (kW)</td>
</tr>
<tr>
<td>Torque (Nm)</td>
</tr>
<tr>
<td><strong>Type</strong></td>
</tr>
<tr>
<td>Gear Box</td>
</tr>
<tr>
<td>No of Speeds</td>
</tr>
<tr>
<td>Model</td>
</tr>
<tr>
<td>Type</td>
</tr>
<tr>
<td><strong>Suspension</strong></td>
</tr>
<tr>
<td>Front</td>
</tr>
<tr>
<td>Semi Elliptical Leaf Spring with Hydraulic</td>
</tr>
<tr>
<td>Rear</td>
</tr>
<tr>
<td>Telescopic Shock absorbers and Anti Roll Bar</td>
</tr>
<tr>
<td><strong>Tyre</strong></td>
</tr>
<tr>
<td>No of Tyres</td>
</tr>
<tr>
<td>Size</td>
</tr>
<tr>
<td><strong>Fuel Tank Capacity</strong></td>
</tr>
<tr>
<td><strong>Options</strong></td>
</tr>
<tr>
<td>Steering</td>
</tr>
<tr>
<td>AC</td>
</tr>
<tr>
<td>ABS</td>
</tr>
</tbody>
</table>

The all new Traveller Smart Citi Bus, redefining Comfort and Safety. Catering to the Modern need of urban mobility in India
Introducing the all New Traveller Smart Citi Bus

**Performance:**
- **16 Valve CRDi, 130 HP** 2.2 Litre Engine (Option: TD 2650 2.6 Litre CRDi Engine)
- Best Durability
- Computer Designed **1Tonne (800 - 1000 Kg) Lighter** Optimized Monocoque Body
- Highest Power to Weight Ratio as compared to Competition Buses

**Reliability:**
- Best in Class Reliable Driveline (Engine, Gear Box and Axle) with Class Leading Aggregate Life

**Best in Class Fuel Economy:**
- due to least Kerb weight
- & Most Efficient Driveline

**Safety:**
- All **4 Wheel Ventilated Disc Brakes**: Class Leading Safety as compared to Drum Brakes used by Competition
- **ABS + EBD**: Only Product in its Category available with this feature
- Security & Safety enhanced by Intelligent Transport System

**Comfort:**
- **Least NVH** (Noise, Vibration & Harshness) enabling Fatigue Free Rides as compared to Chassis built Buses
- Best in Class Ride Comfort
- Passenger Information System & Driver Assistance through Intelligent Transport System

**Elegance:**
- 6th Generation CED Dip Painting to have best Paint Life & Rust Protection
- Robotic Top Coat Application to have Car Like Gloss Finish
- Ultra Modern Styling & Factory Built Body Quality
Feature – Advantage – Benefit Analysis
### Performance & Reliability

<table>
<thead>
<tr>
<th>Aggregate</th>
<th>Features</th>
<th>Advantage</th>
<th>Benefits</th>
</tr>
</thead>
</table>
| **Body**  | Monocoque Body Construction with Unibody Design | • 1Tonne lighter than comparable Chassis based offerings  
Chassis built 20 Str : 4500 Kgs, FML Traveller : 3360 Kgs | • Highest fuel efficiency  
• Lower running cost  
• Highest returns on investment (ROI) |
|           |         | • Least NVH (Noise, Vibration & Harshness) levels (6dBa lesser than chassis built buses) | • Least Driver & Passenger Fatigue |
|           |         | • Highest resistance to Torsional flexing while cornering and sharp turns as compared to Chassis based Buses  
• Lower Centre of Gravity – Better Road Grip & Handling | • Class leading drivability  
• Least driver fatigue & enhanced driver productivity  
• Highest Road Stability and enhanced safety of the occupants |
| **Engines** | Engine Options:  
• TD 2200 & TG 2600  
• Power Range:  
  • CNG – 79 HP (BSIV)  
  • Diesel – 127 HP (BSIV) | • Best in Class Performance and Reliability  
• Most Fuel Efficient Engines in its class | • Highest fuel efficiency  
• Lowest operating cost  
• Least emission footprint |
|           |         | • Least NVH (Noise, Vibration & Harshness) levels  
• Supersmooth and silent engines | • Least driver fatigue  
• Enhanced driver productivity  
• Less turnaround time |
|           |         | • Variable Geometry Turbo Charger – No Lag, Better Engine Performance and Fuel Efficiency, Wider Usable Torque Range  
• Highest Power to Weight ratio in its class  
• Wider Power Bands – Power keeps flowing even at low rpm up to the rated speed | • Least passenger fatigue and hence less tiredness  
• Best driveability in city traffic ensures more driver comfort  
• Less frequent gear shift reduces driver fatigue and improves productivity |
### Performance & Reliability

<table>
<thead>
<tr>
<th>Aggregate</th>
<th>Features</th>
<th>Advantage</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine Torque</td>
<td>High Low End Torque</td>
<td>• Best Driveability Experience</td>
<td>• Least Driver Fatigue</td>
</tr>
<tr>
<td>Engine Torque</td>
<td>Flatter Torque Curve</td>
<td>• No Frequent Gear Change Necessary</td>
<td>• No Engine Stalling even at higher gears and High Speeds</td>
</tr>
</tbody>
</table>

- High Low End Torque and Flatter Torque Curves enable best in class Driveability ensuring least Gear Changes in City Traffic
### Performance & Reliability

<table>
<thead>
<tr>
<th>Aggregate</th>
<th>Features</th>
<th>Advantage</th>
<th>Benefits</th>
</tr>
</thead>
</table>
| Gear Box, Axle & Dual Mass Flywheel | Highly Reliable Gear Box & Axle  
• Ground Gears with Molybdenum Coating  
• Cable shift mechanism | • Heavy duty gear box & axle proven in Indian conditions – Higher reliability | • Lowest maintenance cost and Highest Performance  
• Less frequent gear shift, jerk-free operations results in better drivability, lesser driver fatigue & higher productivity  
• Less frequent gear shift also reduces the fuel consumption resulting in lowest operational costs  
• Ease in gear shifting due to cable shift  
• Ease in gear shifting due to cable shift  
• Ease in gear shifting due to cable shift |

In a 12 M Long Bus AT/AMT is needed because:
- Long Length with Gear Box Mounted at Rear  
- Gear Shifter Position in Front  
- 8-12 Speed Gear Box requires continuous shifting  
- High Clutch Effort due to heavy duty engine clutch

- In a Mini Bus where the distance between the shifter and Gear Box is negligible and with only 5 Gears to Shift, using an AT/AMT gives no added advantage but increases cost  
- The Dual Mass Fly Wheel (DMFW) Technology is one of its kind and the most optimal solution to give the advantages of an automatic/automated manual transmission at lower costs
The DMFW technology coupled with a Special Clutch with MCC lining marginalizes the requirement of an AT/AMT delivering best drivability experience by ensuring least Gear Changes and Gear Change Efforts.
## Economy

<table>
<thead>
<tr>
<th>Aggregate</th>
<th>Features</th>
<th>Advantage</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- Fuel Efficient Mercedes derived Engine</td>
<td>- 12% Lower Cost</td>
<td>- Better Performance</td>
</tr>
<tr>
<td></td>
<td>- Mercedes derived Transmission &amp; Rear Axle mated for Optimum Fuel Efficiency</td>
<td>- 26% lower maintenance cost</td>
<td>- 15% Higher Profits</td>
</tr>
<tr>
<td></td>
<td>- Highly Reliable &amp; Durable Driveline &amp; other Aggregates</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

12% Lower Fuel Cost
26% Lower Maintenance Cost

15% More Profit
### Safety

<table>
<thead>
<tr>
<th>Aggregate</th>
<th>Features</th>
<th>Advantage</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Wheel Disc Brakes with 4 Pistons and Twin Pot Caliper System, <em>1st in LCV Category</em></td>
<td>Best Brake Effectiveness</td>
<td>Least reaction time of brake due to lesser Disc inertia</td>
<td>Least driver fatigue and hence more productivity</td>
</tr>
<tr>
<td></td>
<td>Least Brake Pedal Effort</td>
<td></td>
<td>Longer life of brakes results in lower maintenance cost</td>
</tr>
<tr>
<td></td>
<td>Least moving parts compared to air brakes &amp; lesser brake fading on continuous use on long downhill</td>
<td></td>
<td>Results in higher durability &amp; better braking effectiveness</td>
</tr>
<tr>
<td></td>
<td>All Weather Use - Less tendency to accumulate Water like in Drum Brakes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Brakes

<table>
<thead>
<tr>
<th>Entry Door</th>
<th>Features</th>
<th>Advantage</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Driver Controlled, Electrically operated, Anti-pinch door</td>
<td>Driver controlled electrically operated anti-pinch door</td>
<td>Provides easy ingress/egress accessibility to passengers without harming them</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Can be opened &amp; closed only when the vehicle is stationary</td>
<td>Additional safety to the passengers which ensures there are no accidents</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lower entry step ground clearance</td>
<td>Ease of entry &amp; egress for normal &amp; elderly citizens</td>
<td></td>
</tr>
</tbody>
</table>

- The All Wheel Disc Brakes deliver s best in class Braking efficiency and thus eliminates the need of Air Brakes (Use of which increases acquisition and Running Cost)
- The Traveller Suspension Systems deliver least fatigue which is well below the acceptance standards.
In the case of Mini Buses the Engine is Mounted in the front and the variation on the front Axle from unladen to rated load condition is minimum.

Mandating the use of Front Air Suspension in actual condition does not add any value, but increases the cost incase of Mini Buses, as a rear Air Suspension itself can increase the ride comfort.
- Driver Fatigue has a all new low with the best ergonomically designed seat

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Features</th>
<th>Advantage</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Driver Cabin Comfort</td>
<td><img src="image" alt="Diagram" /></td>
<td>Most ergonomically designed bucket type driver seat for 5th &amp; 95th percentile of Indian driver.</td>
<td>Least Driver Fatigue facilitates highest Driver Productivity and in turn operational viability.</td>
</tr>
<tr>
<td></td>
<td><img src="image" alt="Diagram" /></td>
<td>Reclining backrest.</td>
<td></td>
</tr>
<tr>
<td></td>
<td><img src="image" alt="Diagram" /></td>
<td>Adjustable headrest for added safety.</td>
<td></td>
</tr>
<tr>
<td></td>
<td><img src="image" alt="Diagram" /></td>
<td>Seat sliding forward &amp; backward. Total travel 180 mm.</td>
<td></td>
</tr>
<tr>
<td></td>
<td><img src="image" alt="Diagram" /></td>
<td>Upward &amp; downward height adjustment &amp; with tilting of seat cushion.</td>
<td></td>
</tr>
<tr>
<td></td>
<td><img src="image" alt="Diagram" /></td>
<td>Side bolsters on backrest &amp; seat cushion.</td>
<td></td>
</tr>
<tr>
<td></td>
<td><img src="image" alt="Diagram" /></td>
<td>Attractive fabric upholstery.</td>
<td></td>
</tr>
</tbody>
</table>
### Durability

<table>
<thead>
<tr>
<th>Aggregate</th>
<th>Features</th>
<th>Advantage</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completely Factory Built Body with best materials and adherence to well defined Processes like Robotic Welding</td>
<td>• Best in Class Quality and Durability for Years</td>
<td>• Long Maintenance Free Operational Life</td>
<td></td>
</tr>
<tr>
<td>6th Generation Cathodic Electro Phoretic Dip Painting Process</td>
<td>• Better coverage in box, interior surfaces, sharp corners</td>
<td>• Longest life of the body resulting in higher utilization period</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• No runs, sags and solvent boils</td>
<td>• Least maintenance (repair/replacement) cost reduces the operational cost of the vehicle</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Better chip &amp; corrosion resistance</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Superior in anti-pollution, safety, health hazards</td>
<td>• Ensures the occupant health safety &amp; lower environmental wastes</td>
<td></td>
</tr>
<tr>
<td>Robotic Top Coat Application</td>
<td>• Precise &amp; High quality of paint finish</td>
<td>• Enhanced car like looks of the vehicle</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Longer durability of the colour</td>
<td>• Least maintenance cost (repaint) which reduces the operational costs</td>
<td></td>
</tr>
</tbody>
</table>

- Designed for Best Reliability & Durability for Long Life and Ageless Looks
### Other UBS II Compliances

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Features Internal</th>
<th>Advantage</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Security Camera Network (Through ITS)</strong></td>
<td></td>
<td>• Internal cameras &amp; analog to digital interface enables closed surveillance of the passenger compartment</td>
<td>• Increased safety of the passengers against theft &amp; any misdoing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• External Camera: Ease in reversing vehicle &amp; during parking</td>
<td>• Easy to reverse &amp; park the vehicle in narrow lanes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 48 hrs data recording with data transfer facility</td>
<td>• Data can be viewed offline</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Historical Data can be evidence and can be used for Post Facto Analysis</td>
</tr>
<tr>
<td><strong>Other Safety Features</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Handholds, First Aid, Fire Extinguisher</td>
<td>• Handholds enable the passenger to stand properly in moving bus</td>
<td>• Ease &amp; safe travelling for standees</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Statutory requirements of first aid, fire extinguisher &amp; warning triangle met</td>
<td>• Enhanced Safety of passengers</td>
</tr>
<tr>
<td></td>
<td>Front &amp; Rear Tow Hooks &amp; Fog Lamp</td>
<td>• Attractive front &amp; rear bumper with towing device – to enable the vehicle to be towed in case of breakdown &amp; front fog lamp – for better visibility in fog</td>
<td>• Towing device enables vehicle to be towed in case of breakdown</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Better visibility helps in safe driving for the driver</td>
</tr>
<tr>
<td>Attribute</td>
<td>Features</td>
<td>Advantage</td>
<td>Benefits</td>
</tr>
<tr>
<td>--------------------</td>
<td>-------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Other Safety</td>
<td>Stanchion Bars</td>
<td>• Stanchion bars help the standees to travel easily</td>
<td>• Ease of Commuting in a crowded Bus</td>
</tr>
<tr>
<td>Features</td>
<td>Bus Stop Bell</td>
<td>• Bus stop bell helps the passengers to intimate the driver to stop the vehicle</td>
<td>• Allows walking towards Doors while the Bus is in Motion</td>
</tr>
<tr>
<td></td>
<td>Window Guard Rails</td>
<td>• Window guard protect the passengers, specially children, against peeping out of window while travelling</td>
<td>• Convenience to alight the bus at desired step.</td>
</tr>
<tr>
<td></td>
<td>Wider Emergency exit</td>
<td>• Wider emergency exit window enables passenger to get out of bus in case of emergency</td>
<td>• Can be used in case of Emergency to alert the Driver</td>
</tr>
<tr>
<td></td>
<td>Emergency Hammer</td>
<td>• Emergency hammer provide to break the emergency exit window glass easily</td>
<td>• Prevents accidents &amp; enhances the safety of passengers while commuting in the Bus</td>
</tr>
</tbody>
</table>
## Other UBS II Compliances

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Features</th>
<th>Advantage</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traveller: 14+D</td>
<td><img src="/images/traveller14d.png" alt="Image" /></td>
<td>• High quality plastic seats with foam cushion, high backrest with good ergonomic posture and lumbar support</td>
<td>Better comfort to the seated passengers &amp; standees while travelling</td>
</tr>
<tr>
<td>Traveller: 21+D</td>
<td><img src="/images/traveller21d.png" alt="Image" /></td>
<td>• Seats and Upholstery of TRAVELLER comply with InJURV Mini Bus Specification</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Gangway dimensions of TRAVELLER comply with InJURV Mini Bus Specification</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Ample head room for seated and standee passengers</td>
<td></td>
</tr>
<tr>
<td>Comfort</td>
<td><img src="/images/comfort.png" alt="Image" /></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roof mounted AC</td>
<td><img src="/images/rooftop_ac.png" alt="Image" /></td>
<td>• Roof mounted Air conditioning system saves space on ducting system</td>
<td>Better &amp; noiseless cooling enhances the comfort to the passengers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Eliminates noise from the passenger compartment</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Better ventilation in passenger and driver area</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Individual Flow control vents for passengers</td>
<td></td>
</tr>
<tr>
<td>Individual AC Vents</td>
<td><img src="/images/individual_ac.png" alt="Image" /></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Other UBS II Compliances

<table>
<thead>
<tr>
<th>Features</th>
<th>Features</th>
<th>Advantage</th>
<th>Benefits</th>
</tr>
</thead>
</table>
| **Digital Destination Display Boards** | Size: 285 mm x 980 mm  
- Front & Inner passenger display  
- Multi language support incl. English & Hindi  
- 150 Routes with 250 Bus Stops per route, 300 Destinations possible  
- Designed for extreme dusty & humid conditions and for road vibrations | • Easy information at the disposal of passengers.  
• Details of “Before Arrival”, “On Arrival” at the stop, & “Next Scheduled Stop” of the Bus, specially for a new person in the city | • Hassle free travelling due to precise information of routes & stops for the passengers  
• Prevents the passengers from missing their stops  
• Convenience for the passenger to board right destination bus |
| **Infotainment System** |                                                                 |                                                                                   |                                                                          |
| **Speakers**          |                                                                 |                                                                                   |                                                                          |
| **Microphone**        | • Operates on battery  
• Long battery life                                                                 | • Convenience for the driver to make announcements about the route & stop details |                                                                          |
## Other UBS II Compliances

<table>
<thead>
<tr>
<th>Features</th>
<th>Features</th>
<th>Advantage</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>A - PIS Speaker Volume</td>
<td>B - VHMD Parameter</td>
<td>User Friendly Touch Screen Interface</td>
<td>Easy vehicle monitoring enables safety of passengers</td>
</tr>
<tr>
<td>C - Routes</td>
<td>D - USB Transfer</td>
<td>In-built GPS for Bus Tracking</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Secure Data communication with central server over GPRS/ GSM &amp; Wi-Fi</td>
<td></td>
</tr>
</tbody>
</table>
## Other UBS II Compliances

<table>
<thead>
<tr>
<th>Features</th>
<th>Features</th>
<th>Advantage</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bus Driver Console</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A - PIS Speaker Volume</td>
<td>C - Routes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B - VHMD Parameter</td>
<td>D - USB Transfer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C - Routes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D - USB Transfer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. To copy the files or data from SCU (Single Control Unit) to USB</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. To upgrade the software/configurations of SCU</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>USB on SCU is always in disabled mode and gets enabled only after the driver presses the USB transfer icon</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>USB Transfer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Keeps the backup of data &amp; helps to review the recorded data offline when needed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Multiplexing</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E - Built-in fault identification, diagnostics, and recovery system</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F - Works on CAN</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Easy diagnostics, increases safety of the vehicle from electrical point of view</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduces the complexity of harnesses and fuse</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ease of repair of electrical harness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ensures safety of passengers</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Points for Open House Discussion

- Mini Buses have a central Role to play in Urban Transport in either a principal mode or complimentary to the other modes of transport like Metro Rail, based on the City Population.

- Regulations should emphasize on Performance criteria for Vehicles, rather than specifying Technology to meet these criteria.

- The Mini Buses like Force Traveller should be viewed as distinct from Large Buses. The following technologies may be required for bigger buses but should not be mandatory for Mini Buses:
  1) Air Brakes:—
     a) Mini Buses with Hydraulic Brakes meet notified standards under CMVR 1996
     b) The Braking System is sufficient for a Light weigh Mini Bus like Traveller which is 1000 Kgs lighter than Chassis built Buses
     c) Cost Effective Technologies like All Wheel ventilated Disc Brakes deliver the same Braking Performance at a much lower Acquisition and Running Cost than Air Brakes

  2) Front & Rear Air Suspension:—
     a) The acceleration and ride frequency define the type of suspension selection for a bus.
     b) In Case of Mini Buses where the engine is in the front the variation of load from Unladen to laden condition on the front axle is minimum & hence acceleration & ride frequencies can be achieved with leaf spring at front and Air Suspension at the rear. This enables comfortable ride comfort (within norms) in the most cost effective way.

  3) Automatic/Automated Manual Transmissions:
     a) In Mini Buses where Engines are mounted in the front The gear shift effort is less due to Short Distance ergonomically placed lever, cable shift and double synchro mechanism. The clutch pedal effort is less due to lower clamp loads and spring assisted clutch pedal.
     b) Cost Effective Technologies like Dual Mass Fly Wheel (DMFW) deliver the required performance to facilitate lesser Gear Changes and Gear Shift Effort, and hence eliminate the need of expensive Automatic/Automated Manual Transmission

  4) 24 V Electrical System:
     a) Unlike the 12m Heavier Buses wherein given the mass of vehicle & high displacement engines, the Electrical Loads for Engine Start are higher due to bigger Flywheel Inertias. The Mini Buses have a small Dual Mass Flywheel and Lesser electrical loads.
     b) Mandating a 24V Electrical System for Mini Buses will lead in Electrical losses and overall rise in Acquisition and Maintenance Cost.
Thank You