The new developed Ashok Leyland BSVI aftertreatment system

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BS 6 will create a significant reduction in PM and NO$_x$ Emission of Trucks

A drive towards Cleaner Future

![Graph showing emission reduction from BS III to BS VI for PM and NO$_x$](image)
India moved directly from BS 4 to BS 6 in much shorter time than EU or US.

<table>
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<th>Year</th>
<th>EU 3</th>
<th>EU 4</th>
<th>EU 5</th>
<th>EU 6</th>
<th>7 Years</th>
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India

- BS III
- BS IV
- BS VI

USA

- EPA 07
- EPA 10

Europe

- EU 3
- EU 4
- EU 5
- EU 6

3 Years

Ready for Global Markets

- Fastest Development
- Right Strategy
- Exhaustive Validation
- Mass Production
BS VI Level – Emission Reduction Technology

Emission Control

- in-cylinder
- exhaust aftertreatment
BS 6 Approach

SCR Efficiency

- Massive EGR
- High EGR + DPF + Low SCR
- 0-60%
- Suitable only till BS IV

Low EGR + DPF + Medium SCR
- 60-92%
- Medium NOx Strategy

Low EGR + DPF + High SCR
- 92-95%
- More Robust Choice

High SCR
- >95%
- Future Proof

High EGR + DPF + Low SCR
- High Thermal Requirement
- Less suited to Indian Condition

- Better TCO
- Less Ad Blue
- High Durability
- Low Maintenance Cost
A Proven Synergy

Over 2.2 Lakh Vehicles Domestic

Over 1 million kits globally
Gradual development of emission technologies by Ashok Leyland to meet increasingly stringent Bharat Stage emission standards in India

2010 - BS 4 standard
- Intelligent EGR system & SCR based aftertreatment to fulfill BS 4 emission standard

System experience & knowledge growth
- Eight years period of ever-expanding knowledge & experience within BS 4 & upcoming BS 6 emission standard

2018 - BS 6 standard
- Provision of an innovative aftertreatment system based on proven SCR technology including DOC & DPF system to fulfill following emission standard BS 6. Contribution of Albonair Euro 6 experience for BS 6

BS 4 with EGR system
- EGR system
- ECU

BS 4 with SCR based ATS
- SCR
- ASC
- Urea Dosing System
- ACU
- Urea Tank

BS 6 system with EGR and ATS with SCR, DOC & DPF
- DOC
- DPF
- SCR
- ASC
- HC doser
- Urea Dosing System
- Fuel tank
- Urea tank
- A2CU+
Modular, stand-alone aftertreatment control unit used for all engine variants

**Aftertreatment Control Unit**

**Dosing module actuation**
**Dosing strategy module**
**DOC strategy**
**System monitoring functions**

- **HC doser actuation**
- **DEF heating strategy**
- **Functional safety**
- **Regeneration strategy**
BS 6 project scope – common parts for all versions

- UDS (dosing unit)
- Control unit
- Nozzle
- HC doser
- Level/Q-sensor
- Delta-P sensor
- PM sensor
- NOx sensor change
- Temp. sensor
Patented Albonair dosing nozzle with superior spray quality compared to airless systems allows flexible positioning of the system

**Albonair Dosing Nozzle**

» Spray Quality of < 15 µm SMD – much finer spray quality than of airless systems

» Extremely heat resistant dosing nozzle (up to 800 °C) without cooling

» Suited for close coupled position

» Very Compact design (110 g) with great installation flexibility

» No mixer for droplet decomposition required

» Avoiding DEF deposit formation

» Spray angle: 20 °
On-road trials

• in total more than 5 million km with test vehicles up till now

• in total more than 10,000 hours on the engine test bench
BS 6 will increase fluid fuel consumption only 2 % fuel plus 3 % AdBlue®

- The fluid economy of B 6 compared to BS 4 is higher by 5 %. This is due to Engine Fueling + HC dozer + Urea Dosing, whilst in BS 4 it was only engine fueling (iEGR for after treatment)
- CO₂ increase of 2.5 % is seen in BS 6 compared to BS 4
Localized production

➢ Local for local approach

➢ Albonair UDS and tank assembly production in Ennore
  ➢ automated UDS production line
  ➢ clean room to fulfill cleanliness requirement
  ➢ experienced and creative management team
  ➢ modern professional equipment
DPF Service will be established

• Diesel engine emissions contains ashes
• Source for ashes is mainly the engine oil
• For BS 6 a low ash oil is mandatory
• DPF will need cleaning after 300,000 km to 500,000 km
• The design of the exhaust aftertreatment system is suited for easy exchange of the DPF
• The DPF will be cleaned by Albonair and AshokLeyland service
• Professionally cleaned Albonair DPF will again have the full warranty
Conclusion

• BS 6 system is a combination from EGR system and SCR system used by Ashok Leyland for BS 4

• Experiences of Euro 6 were transferred to BS 6.

  NOx emissions in BS 6 compared to BS 4 are greatly reduced

• Exhaust Emission Systems have good reliability and performance (more than five million kilometres of testing)

Albonair and Ashok Leyland are ready for BS 6