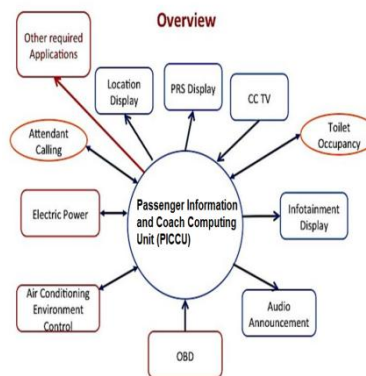# SMART COACH

An initiative by Modern Coach Factory towards predictive maintenance along with infotainment and advanced passenger amenities with introduction of PICCU (Passenger Information and coach computing Unit)

Smart Coach features

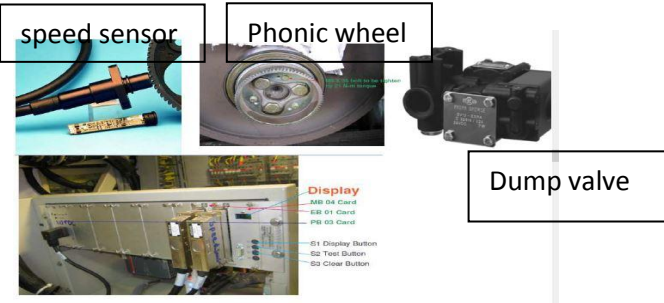## PA/PIS, Passenger Infotainment, Digital destination board

PA/PIS:	WI-FI infotainment system
Automated GPS based announcement triggers from PICCU using pre-recorded voice segments regarding Train Number, Train Name, Speed, Next station, running speed of train, distance remaining, expected time of arrival, delay and safety messages.	Passengers can view Movies, Songs, Videos, Play Games and also view journey progression on their handhelds using mobile based Application. Access on smart phones/Tablets etc. – Hot spot, enunciator, Meal on demand, Passenger complaint

Flush type LED Digital Destination Board displaying text in two rows

Row 1: Train Number and Coach Type

Row 2: Scrolling text display of destination and intermediate station in multiple languages.

Safety and On board Coach diagnostic system

The feedback received from 1st smart coach are as follows

- Total run 11,500 miles so far, with daily run of 500 miles.
- Live location of coach & live condition of CTRB & Wheel.
- Slight increase in vibration trend with time.
- Maximum speed: 72 miles per hour & normally between 5 to 68 miles per hour.
- Average Vibrations higher than European trains.
- Both bogies showing different levels of vibration.
- Magnitude of impact increases with speed.
- Hard spot on track: Jaitipur & Goshainganj.
- TGI, Ride Index, Lateral & Vertical accelerations, Derailment co-efficient

Energy harvester-based wheel node sensors, WSP, Fire detection and alarm system.

The **Energy harvester-based sensor** monitors the condition of wheel, bearing and hard spots on the Track. The same is fed to the data concentrator and transmitted via GPS/GPRS to a remote server

The following data can be used for diagnosis purpose:

• Health Index: Wheel health Index (WHI) and Bearing Health Index (BHI) • Vibration Levels • Average Power Spectral Densities (PSDs) • Dependence between maximum vertical impact and speed • Track Geometry Index • Ride quality	
WSP [wheel slip protection monitoring]: Integration of WSPD with PICCU and posting of data live on the web server will help Railways detect faulty Dump valve, brake binding cases and prevent premature turning of wheels	speed sensor Phonic wheel Dump valve Display MB 04 Card EB 01 Card PB 03 Card S1 Display Button S2 Test Button S3 Clear Button

Fire detection & Alarm System:
Fire and smoke detection unit with integration to PICCU.

Security and surveillance system

IP based **CCTV POE camera**, Face recognition, video analytics 6 cameras fitted on the coach	**Emergency Talkback** It can be use to talk to Guard of Train in case of emergency for stopping the train.

give live recording. With PICCU footage can be accessed from control centre itself. Video analytics with face detection feature & unusual occurrence feature.	

Monitoring and Control of other sub systems of coach

HVAC

❖ Temperature & Humidity ❖ HEPA filter performance ❖ Chocked filter indicator ❖ Air quality index ❖ Power consumption ❖ Compressor cycle monitoring ❖ Fresh air monitoring	

Vacuum Toilet status **Water seal in lavatory** **Exhaust Fan working** **Working of water Pump** **Switch board cabinet**	**Water level** in water tanks: **SMS alert to next watering station** Water level indicator (Display)(Inside of coach) Water level indicator (Display)(Outside of coach)

Current Status:
MCF has rolled out 3 Smart Coaches in 2018-19.
Further 100 coaches have been planned for which case is under TC and will be planned accordingly.