BRIEF ON ELECTRICAL MULTIPLE UNITS (EMU)

Electrical multiple units are used by Indian railways to carry mass passengers in metro and inter cities. The unit consists of motor coach and multiple trailer coaches. The motor coach is the driving coach. With traction electrics and four traction motors are fitted to the bogies. Set of units will comprise to form a train set.

This is a sleek structure built out of Corten / copper bearing ms sheets, plates and stainless steel sheets. Items are sheared / profile cut and then formed to various shapes as per drawing dimension in press brake.

The coach consists of the following modules. The fixtures to do the assembly have been developed.

1. Underframe
2. Side walls
3. End walls
4. Roof
5. Body shell
6. Bogie frame
7. Bogie bolster

1. Underframe
   This is the bottom structure and on this superstructure is built. It is made out of corrosion resistant structural steel to specification IRS M-41/copper bearing quality steel to is 2062 Fe 410 Cu Wc.

2. Side walls
   It is an arrangement of sides in the body shell assembly. The frame work is of low alloy high tensile corrosion resistant steel to specification IRS M-41. The body pillar is of stainless steel to specification AISI-409M having yield stress of 35 kgf/mm2. Pillars will connect the under frame and the roof structure. It is a structure built on skins having window cut outs with pillars, braces and stiffening members. Items are spot welded.
3. **End walls**

It is a frame structure built by ‘Z’ sections and hat sections. It is integrated to the skin. These are the ends of the body shell assembly. Items are spot welded.

4. **Roof**

The side members are ‘C’ shape section located apart and on this roof carlines are located and welded. The roof carlines are press formed curved section. The contour of the carlines will determine the shape of the roof assembly. The
carlines are connected by purlines ‘u’ shaped pressed part, which will seat in the grooves of the carlines. The purlines are welded to the carlines. Roof sheets are covered on the carlines and welded. The other brackets are welded in the roof assembly.

5. **Body shell assembly**
This is the integration of under frame, doorway frames, side walls, end walls and roof assembly.

6. **Bogie**
This is robust welded structure for taking the brake gear, suspension etc., and capable of withstanding the maximum static and dynamic stresses under the
load conditions. The bogie frame shall be of copper bearing steel plates to IS2062.

7. Brakes
Electro-pneumatic brakes are used. When the brakes are applied electro-pneumatically, the main reservoir pressure must not drop more than 0.7 kg/sq cm in one hour on motor coach or more than 0.9 kg/sq cm in one hour on one ‘3 car-unit’. The air panel shall be isolated while conducting test.

8. Equipments in main power circuit
The current will be obtained from 25kv ac, single phase, 50hz overhead line through pantograph and vacuum circuit breaker mounted on the roof of the motor coach. This incoming supply will be fed to the primary of the main transformer and stepped to a lower voltage and converted to dc through suitable converter e.g. bridge connected silicon rectifiers and smoothening reactors and fed to 4 parallel connected dc series motors. The tap changing switch group connected to the transformer secondary shall obtain the speed regulation.

9. Furnishing
Coaches are furnished with sliding doors, windows, coach floor, paneling of side walls, end walls & roof, fixing of seats, luggage racks, support frames, furnishing of driving cab, LT cab, HT cab, coach furnishing with tube light fittings & fans.
Some Illustrative Views of EMU

Sketch view of Trailer coach

Arrangement of Seats