

## **Electrical Blog No. 41 - Traction Power System in Hong Kong**

A traction power system generally refers to an electricity grid for the supply of electrified railways. Traction motor (i.e. electric motor) installed on the train converts the primary rotational torque into linear motion (i.e. traction) that drives the train. The most common railway electric traction systems would employ direct current (DC) or alternating current (AC) systems.

The DC traction system would normally be applied to short distant services with operating voltages between 600, 750 and 1,500 volts. In Hong Kong, 750 volts DC system is adopted for short distant service of Light Rail Transit System at Tuen Mun while 1,500 volts DC is adopted for longer distance services of Mass Transit Railway System at Kwun Tong Line, Tsuen Wan Line, Island Line, Tseung Kwan O Line, Tung Chung Line, Airport Express Line and the Disneyland Resort Line. The DC traction power is fed from rectifier-transformer unit in traction feeder stations along the rail to provide DC voltage traction supply via overhead line transmission system to the trains.

Since the DC traction system is operated at relatively low voltage, the currents involved are large in order to transmit sufficient power and large current operation results in large transmission system losses, therefore AC traction system would be more suitable for relatively long distance transmission at high voltages (tens of thousands of volts). In Hong Kong, 25kV single-phase AC is adopted for East Rail Line, Ma On Shan Line, West Rail Line and the future Guangzhou-Shenzhen-Hong Kong Express Rail Link. The AC traction power is fed from high voltage power supply network through traction feeder stations along the rail to provide high voltage traction supply via overhead line transmission system to the trains.

Both DC and AC overhead line transmission systems require at least one collector attached to the train so it can always be in contact with the power. Overhead current collectors are commonly called "pantograph" and the return circuit is via the running rails back to the substation.

The Electrical Blog is contributed by the Electrical Division. If you would like to know more about this topic, please contact the Division Hon Secretary, Ir K.M. LEUNG at 'kmluong@emsd.gov.hk'