

Improving London Underground's power supply

Five ABB Static Var Compensators (SVCs) and ten Harmonic Filters have been installed at critical points on the London Underground 22kV distribution grid. As a result, the entire underground rail network is now able to draw all its power from the National Grid.

The Background

In 1998, London Underground signed a 30 year Private Finance Initiative (PFI) contract with SEEBOARD Powerlink – a consortium formed by EDF Energy, Balfour Beatty and ABB – to manage, maintain, develop and finance London Underground's power supply system. A key element in this scheme was the planned closure of the dedicated 180MW Lots Road power station with London Underground taking all its power from the National Grid, via London's local Distribution Network Operator, EDF Energy.

It was found that the additional traction load on the local distribution network, due to the diode rectifiers which feed DC electricity to the trains, would have an adverse effect on the power quality for the London area unless corrective action was taken.

A £60 million 'Power Quality' variation to the original PFI contract was agreed and the majority of the specialist work was awarded to ABB who carried out a series of extensive studies of the existing electrical system.

The Response

The key element in the contract was the design and installation of five Static Var Compensators (SVCs). These smooth load fluctuations and reduce harmonic disturbance on the two power distribution networks, at 22kV and 11kV, which provide power to 158 delivery points. This now enables London Underground to meet its annual 900,000MWhr power requirement by connecting to existing substations, which also feed sensitive loads in the City of London.



The 22kV transmission and 11kV distribution London Underground power supplies are converted by local transformer rectifiers to provide 630V/750V DC for the train motive power. The transformers also provide lower voltage supplies for lighting, lifts, escalators, ticket barriers, communications and control systems and so on.

The Verdict

London Underground is now able to draw the power required for all its surface and underground trains from the National Grid which is a considerably more reliable source, and this has facilitated the closure of the old Lots Road power station, Chelsea.

The size of the London Underground, which serves 270 stations and over 250 miles of track, combined with the nature of the train loads – with large numbers accelerating and braking at any one time – made the project one of the most complex reactive power compensation studies ever undertaken.

For more information please contact:

ABB Limited
Power Products: +44 (0)1925 741111
Power Systems: +44 (0)1785 825050

www.abb.com/uk