Rail Success Story

Victoria Line upgrade – delivering quality power in quantity

ZX2 switchgear.

The Victoria line is one of the busiest on the London Underground (LU), carrying over 630,000 passengers a day and 183 million each year.

It is now getting even busier thanks to a major upgrade with new trains that offer a smoother, more comfortable ride, with more frequent trains, a reduction in journey times and around 21% more capacity. The new trains need more power, and to help meet this demand, ABB has reinforced the LU 11 kV power network by creating a new Bulk Supply Point (BSP) and an associated Static Var Compensator (SVC) power quality solution.

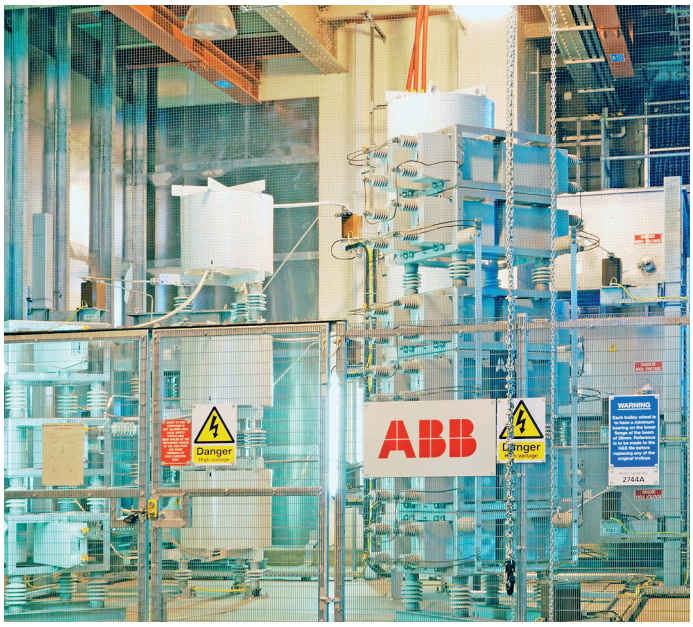
New BSP

The new BSP, which provides an additional 90 MVA of power, was created within the shell of an existing substation building – including a mezzanine floor that effectively doubled the available installation space. This provided ample room for the 42 panels of double busbar ZX2 primary gas insulated switchgear (GIS) that has replaced the existing switchboard.

Since the new floor is directly above the DC rectifiers, a heavy-duty ventilation system has been provided to ensure the effective removal of trapped heat.

The transfer of the circuits from the old to new switchboard was carried out on a phased, rolling basis to make optimum use of the limited outage time available. Thanks to the extremely tight project coordination all 26 changeovers were accomplished on time, without a single delay.

In addition to the new switchgear and high voltage cabling and jointing, ABB has also supplied new protection and control systems including the installation of REF542+ relays to communicate with the local SCADA system and coordinated relay solutions at the remote ends in the other substations it connects with.



SVC.

SVC power quality solution

The variable nature of the loads on the LU power grid, such as trains starting and stopping and escalators, means that it is subjected to substantial voltage fluctuations and harmonics. Power quality measures play a vital role in preventing these disturbances from reaching the public grid. Since 2000, ABB has played an active role in optimizing LU's power quality by designing, installing and commissioning a number of Static Var Compensators (SVCs) and stand-alone harmonic filters that now operate at critical points in the 22 kV and 11 kV grids.

System studies carried out by ABB indicated that the additional quantity of power input provided by the new BSP, together with the increased future loads, would have significant power quality implications for the LU network. It was therefore decided to install an additional SVC. Ideally, this would have been located at the BSP, however space requirements dictated that it should be constructed at the closest suitable site, which was another distribution substation.

The existing building was remodelled to house a 33 MVAr SVC, designed and manufactured by ABB's specialist power quality facility in Sweden. Two stand-alone 5.5 MVAr harmonic filters were also installed.

Careful coordination of the various stages was key to the smooth hand-over of the overall Victoria Line power upgrade project. Therefore the SVC was commissioned first, then the BSP, and finally the new grid transformers were brought on line to complete the connection.

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