CHALLENGES AND OPPORTUNITIES WHEN INSTALLING HV CABLE IN AUSTRALIA AND SRI LANKA

Naveed RAHMAN, Olex Australia (a Nexans Company), (Australia), nrahman@olex.com.au
Ken BARBER, Olex Australia (a Nexans Company), (Australia), kbarber@olex.com.au

ABSTRACT

Those involved in the cable installation field know only full well, every installation project has unique challenges, with no two installations being exactly the same. Having just completed two significant 132kV cable contracts in two completely different cities, we believe there are however, some valuable lessons learnt for future projects.

This paper looks at the design and construction of two projects, one in the city of Colombo, Sri Lanka and the other in the city of Brisbane, Australia. Both are the most significant cable projects for each country and in both cases the objective was to extend the 132kV power supply system and optical fibre communication system together with the construction of new substations. The paper describes some of the key aspects of each project and compares similarities and differences.

KEYWORDS

Turnkey projects, design, cross bonded systems, ducted installation, traffic conditions, cable installation, construction works.

INTRODUCTION

To meet the increasing demand for electricity in the highly populated growing capital of Sri Lanka, Ceylon Electricity Board (CEB) decided to upgrade the existing 132 kV network in Greater Colombo area. There are two main load centers in Colombo naming Kolonnawa and Pannipitiya substations, which are connected to the National Grid by overhead transmission lines. These substations are also connected together by an overhead 132 kV transmission line. The new link comprised the establishment of four 132 kV underground cable circuits and the associated optical fiber circuits between the above substations via three new grid substations at Maradana, Havelock Town and Dehiwala forming a ring connection to increase the reliability of the power supply in the Greater Colombo area. Never before has an underground cable project of this magnitude been undertaken in Sri Lanka.
Olex Australia won the contract for Design, Supply and Installation of approx 80 km's of 132 kV power cables and associated optical fiber cables on turnkey basis.

Energex, a supplier of electricity in State of Queensland, Australia, had identified a major infrastructure project to reinforce and ensure reliability of electricity supply to Brisbane Central Business District. The City Grid project brief was to design & install and commission approx 75 km's of 110 kV power cables and associated optical fiber cables. Unlike Greater Colombo Project, the City Grid project consisted of three separate contracts, i.e. design, supply and construction and all three contracts were awarded to Olex Australia Pty Ltd. The objective of this project was to extend the 110 kV power supply system and optical fibre communication system in the Brisbane area, by constructing two 110kV cable circuits and Optical Fibre communication links between the existing Charlotte Street Substation and the new Carindale Termination Point via Wellington Road Substation.

Being two large EHV underground cable installation projects of similar size one in South East Asia and the other in Australia there are similarities as well as differences both in design and construction aspects of each project. The Greater Colombo Grid substation project was to be constructed in a densely populated South East Asian city where as the latter was in a developed city in Australia. However the challenges were somehow similar as in both projects the cable route passed through the main CBD districts of Colombo and Brisbane, design approvals from the clients were required, construction permissions/permits were needed prior to start of construction activities etc. The Colombo project was funded by a German loan and the payment process was more complicated and time consuming when compared to the project in Brisbane. The rules, regulations and formalities imposed by different regulatory bodies in both countries were very challenging causing difficulties and there were delays in completing both projects due to third parties works.

DESIGN SIMILARITIES

Preliminary designs for both projects were done by the Client's independent consultants and the detailed designs for the cable circuits were finalized after the award of contract.

Both projects comprised of cross bonded systems to optimize cable circuit ratings. On both projects similar cable accessories were utilized. Temperature monitoring was also one of the key design features on both projects and most importantly the cables were installed in a fully underground ducted system to minimize traffic disruptions.

Water blocked Milliken sector plain annealed copper conductors with semiconductive conductor screen, superclean XLPE insulation, semiconductive insulation screen, and semiconductive swellable tapes are some of the similarities in cable designs.

The native soil thermal resistivity, practicality of the joint bay locations, identifying existing underground services and selection of correct backfill materials were key inputs in finalizing detailed designs for projects.