

H3RO: Thomson East Coast Line Tunnelling Project

Background

Reliable communications infrastructure and networks are vital to ensure the safe and on time completion of underground tunnel construction.

Ampcontrol was engaged to support the Thomson East Coast Line project in Singapore, which consisted of two tunnels with one launch shaft and one arrival shaft created by a tunnel boring machine.

Ampcontrol provided communication infrastructure for everyday and emergency voice communication requirements and for real-time monitoring and reporting to the surface.

Achievements

- Cost savings
- System standardisation and simplification
- Ability for expansion and dynamic network layout
- Reduced downtime due to more suitable harsh environment connectors
- Self-sufficient fibre optic maintenance without specialised technicians
- Lower loss between fibre optic connectors
- Fast and easy deployment and re-deployment of fibre optic cable for re-use in other projects

Problem

Tunnelling applications require repeatable patterns of emergency call points every 100m, these call points need to be installed as the tunnel borer progresses while maintaining reliable communications. The traditional approach to networking these emergency call points presents a number of limitations.

The fibre optic communications infrastructure relied on military spec (MilSpec) connectors. These connectors are expensive, bulky and prone to breaking where the heavy attachment joins the cabling.



+ Reliable fibre optics communications infrastructure and networks

Failed or broken MilSpec cable require expensive repairs and fibre experts to cut, splice and terminate long cable runs and add additional fibre optic network cabinets. This made extensions to the network difficult requiring specialist tools and labour.

Emergency call points are required to be quickly deployed in a standard fashion with quick setup, removal and re-deployment. The standard set up is for each emergency call point to be linked to other call points in a daisy chain, meaning there are two bulkheads required within each call point. Not only does this make it a costly installation, but the arrangement takes up significant space within the limited room in the fibre system enclosures.

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Solution

Ampcontrol deployed H3RO, our harsh environment reticulated optic solution which reduces network complexity and offers plug and play functionality with off the shelf components which do not require fibre specialists to install.

Offering superior versatility with its 'plug and play' modular components, H3RO removes the requirement for patch panel cabinets and allows for system standardisation which simplifies the network and reduces complexity. When compared to traditional MilSpec connectors, H3RO connectors have loss levels up to 20 times lower, providing overall system efficiency. By using this single mode modular network solution, Ampcontrol was able to reduce the capex cost of the optical network, simplify the topology and replace error prone and expensive network cabinets with H3RO Break-Out Terminals (BOTs).

On the ground maintenance is made easy with the H3RO system, with the connectors designed to accommodate cost effective standard fibre cleaning tools. This means day to day maintenance, such as removing any dust or dirt contaminants, can be carried out onsite without requiring a fibre specialist. Not only does this enable site works to continue efficiently, it reduces unforeseen costs which can be associated with projects in these environments.

The system is designed to be future proof, with the modular components enabling quick and easy duplication or extension as required, based on any configuration. With this in mind, the system package was designed in a way that simplified the overall communications network and consolidated spares requirements. One of the major benefits offered by the H3RO system is the versatile design. When the project scope changed and additional fibre optic networking was required, H3RO allowed for easy extension. Additional surface infrastructure was required to be connected to the network including a workshop, medical lock and office area. Drawing on the H3RO fibre backbone of the existing network, the design was easily expanded with a single H3RO BOT (Break-Out Terminal) which allowed for three lots of 4 core fibre cables to be diverted from a 12 core trunk to these separate areas. This network extension was completed by site labour in a quick and timely manner keeping the overall project on schedule.

