CASE STUDY
Transcity Joint Venture

MOTOROLA THE CLEAR CHOICE FOR CONSTRUCTING BRISBANE'S LEGACY WAY TUNNEL

HYBRID ANALOGUE AND DIGITAL RADIO KEEPS CONSTRUCTION TEAMS SAFELY CONNECTED

Scheduled to open to traffic in 2015, construction of Brisbane City Council's $1.5 billion, 4.6km Legacy Way tunnel began in early 2011, managed by a unique joint venture between Brisbane-based BMD Constructions, Italian company Ghella and Spanish company Acciona – collectively called Transcity. Once open in 2015, Legacy Way will connect the Western Freeway at Toowong with the Inner City Bypass (ICB) at Kelvin Grove, and almost halve peak hour travel times between the Centenary Bridge and the ICB.

Communication is one of the most fundamental safety elements in any construction project and is particularly critical for a major tunnelling operation.

Together with experienced technology partner Trans Communications, Motorola has delivered a highly effective hybrid analogue and digital two-way radio system that ensures anytime, anywhere communications throughout the tunnel construction site. Supported by a microwave digital backup and Sigma leaky feed backbone and head end system that span the full length of the site, the new radio network keeps Transcity teams safely connected 24/7.

CUSTOMER PROFILE
Transcity Joint Venture

Industry Name
Construction

Technology Partner
Trans Communications

Product Name
- MOTOTRBO DP3400 portable radios
- MOTOTRBO DP3600 portable radios
- MOTOTRBO DM3600 mobile radios

Solution Features
- Hybrid analogue/digital handsets
- Multiple simultaneous channels
- Emergency frequency override
- Rugged, water resistant design

Key Benefits
- Uncompromised safety
- Superb audio clarity
- Complete site coverage
- Hands-free operation
- Failsafe backup
- Dedicated emergency channel

THE CHALLENGE

Shortly after launching the massive four-year tunnelling construction project in 2011, Transcity, the joint venture company selected by Brisbane City Council to deliver the Legacy Way Tunnel, was faced with an unexpected hurdle. Changes to the Queensland Tunnel Code of Practice came into effect in June 2012, resulting in additional, rigorous safety requirements mandated before construction could commence.

The radio communications network needed to be operational and ready for use around-the-clock, reliable (especially in emergency situations), and suited to perform during any and all types of emergency: evacuation, flood, fire, tunnel collapse and power failure. It also needed to survive and remain operational in the event its main transmission system was cut.

"It was imperative that we consulted with the right people who had experience in designing and implementing communication systems for this type of project. We wanted to go above and beyond the stringent requirements of the Tunnel Code of Practice and our own rigorous planning and preparation to ensure the safest possible workplace," says Filipe Pinheiro, the senior Transcity electrical engineer responsible for sourcing the communications system.

The site was at times incredibly noisy, wet and dusty, with two tunnel boring machines (TBMs), each measuring 12.4 metres in diameter, approximately 110 metres in length, and weighing upwards of 2,800 tonnes, working round-the-clock.

THE SOLUTION

Brisbane-based Motorola partner Trans Communications was chosen to design and supply the radio system for Legacy Way following a comprehensive market tender. The system comprises three "leaky" feeder cables that provide both transmission and reception for the radio handsets in the tunnels, one high power surface amplifier for surface communications and approximately 30 base

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stations mainly installed into the construction vehicles on site but also on each of the TBMs.

"Trans Communications' availability and keen interest in the project made them stand out when we were considering who to partner with on this project," says Pinheiro. "They gave us all the answers we needed and they had the experience to match their enthusiasm. They have been a fantastic partner throughout with their efficiency and skills in the field proving invaluable on a project of this magnitude."

Two different models of portable radio handsets were selected: 200 Motorola DP3400 and DP3600 units, complemented by 30 Motorola DM3600 in-vehicle radios (that double as base stations). The hybrid analogue/digital handsets are optimised for voice communications using 16 separate analogue channels, including an always-on channel that can override the others in case of emergency.

IP67-rated waterproof Motorola digital radios and IP67-rated waterproof Sigma BI directional amplifiers were chosen for the leaky feed communications path to ensure reliability.

A second dedicated emergency channel, transmitted using digital microwave technology, provides a failsafe backup for the entire system and power to the main and backup systems is UPS-protected, providing 36 hours of backup power in the event of a total power failure.

"It's a clever design that ensures all the handsets are active and clearly audible all the time, and under all conditions, and the entire system remains operational even if one or both the leaky feeder cables is accidentally damaged," says Pinheiro. "Since we have different teams of engineers, construction workers, electricians and so on, the system also provides separate channels for team members to communicate with each other uninterrupted."

THE BENEFITS

Pinheiro says the single biggest benefit of the system is safety. "You can't put a price on safety, and the clarity, capacity and range of the radio system was selected with safety in mind, first and foremost."

"Naturally the other features of the system contribute to the smooth operation of the project. For example, being able to use the handsets belted, and to see visible status indicators without having to physically handle the handsets, makes them particularly effective for this type of project and in these conditions."

The solution also enabled a more efficient workplace, critical to a project that depends on the timeliness of completion.

"The radio communication system has had a huge impact on production," says Pinheiro. "The clarity of voice in either digital or analogue mode means we are not losing any time to miscommunications. We have had a high standard of productivity that is hard to measure but that we know is there."

Other benefits specific to the Motorola digital/analogue handsets include:

- Rugged and IP67-rated design, tightly sealed against wind and dust, submersible in up to one metre of water for 30 minutes.
- Easy switching between analogue and digital functions for seamless operation.
- A powerful front-projecting speaker that transmits in digital or analogue.

"As far as I know this is the first system of its kind deployed in Australia – and possibly the world – that provides all the utility, flexibility, capacity and safety features we wanted in one integrated solution," says Pinheiro. "That's largely down to the skills, experience and service of the Trans Communications and Motorola teams, always ready with a positive solution to our challenges."

About Trans Communications
Trans Communications sells, services, repairs and maintains digital and analogue two-way radio equipment. In addition, we also assist with the establishment and design of new radio communication systems, such as tunnel/leaky feed communications (amongst others). We also offer a professional assessment of existing operating platforms and give expert advice accordingly.

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