PBE
TUNNELLING

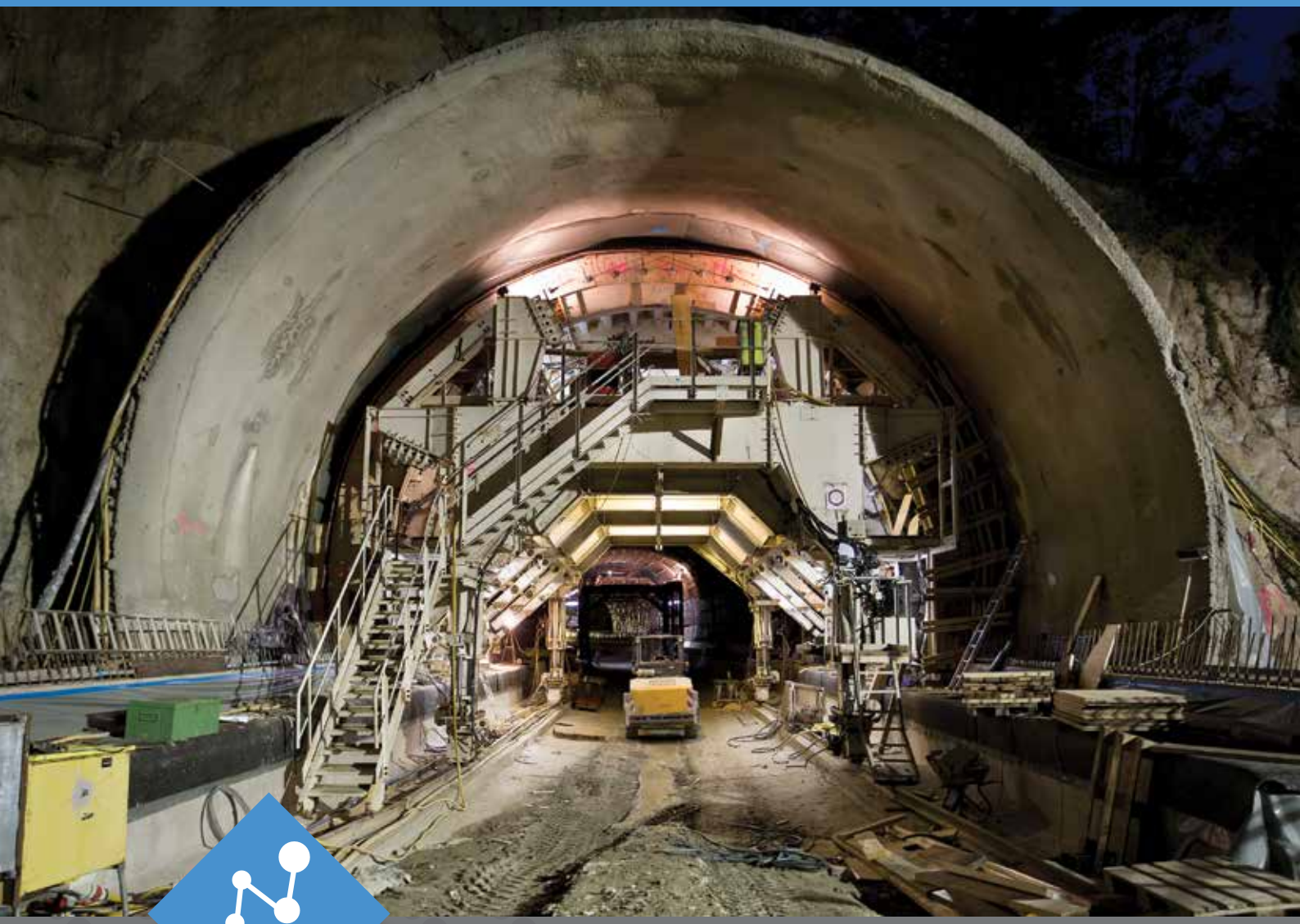
DATA
SAFETY
POWER

DATA, POWER & SAFETY SOLUTIONS FOR THE TUNNELLING INDUSTRY



INNOVATING SAFETY. ***POWERING PRODUCTIVITY.***

pbegrp.com



DATA

PBE Data & Communications Infrastructure



Real time data to improve safety and increase productivity

PBE designs, engineers and manufactures integrated solutions for safety in tunnels globally for both the construction stage and permanent infrastructure.

PBE offers various communication technology and data infrastructure to enable reliable voice and data to be transported to the surface. These systems can be deployed as a combination of multiple technologies to meet customer needs.

These solutions can also be deployed to provide redundancy where communications are critical. The network infrastructure provided is used by PBE's own extensive suite of safety and productivity products as well as 3rd party applications and devices for data backhaul.

Vantage - Monitoring & Control System

Vantage is PBE's proprietary centralised web-based monitoring and control system used to maximise safety and increase productivity in underground environments.

The Vantage software platform provides a user-friendly navigation interface allowing intelligent control, monitoring and reporting facilities. This enables an integrated safety system to be deployed from a single IoT platform.

Features of the Vantage system include:

- Network wide control and monitoring
- Historic playback of all events
- Suitable for PBE's complete product portfolio and integration of 3rd party systems
- Detailed customisable reporting
- Integration of system maps

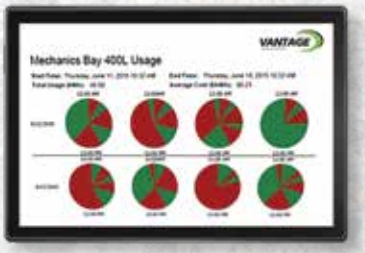
Example of some Vantage applications



Tracking Network



Environmental Monitoring



Responsible Ventilation



Proximity Detection System

Network infrastructure includes:

Leaky Feeder Construction Phase Infrastructure

Leaky Feeder systems offer clear two-way radio communication and low to medium speed data transfer capabilities throughout the tunnel network. PBE provides a wide range of leaky feeder system options including conventional leaky feeder systems and CMTS high speed data systems. Simple to deploy and maintain, leaky feeder solutions are ideal for construction environments.

Radiating Cable Voice and Data Networks

Radiating cable systems offer reliable and clear two-way radio communication and high-speed data transfer capabilities throughout your underground complex. Used for permanent infrastructure, the cables are passive in nature requiring minimal underground maintenance.



State of the art leaky feeder infrastructure



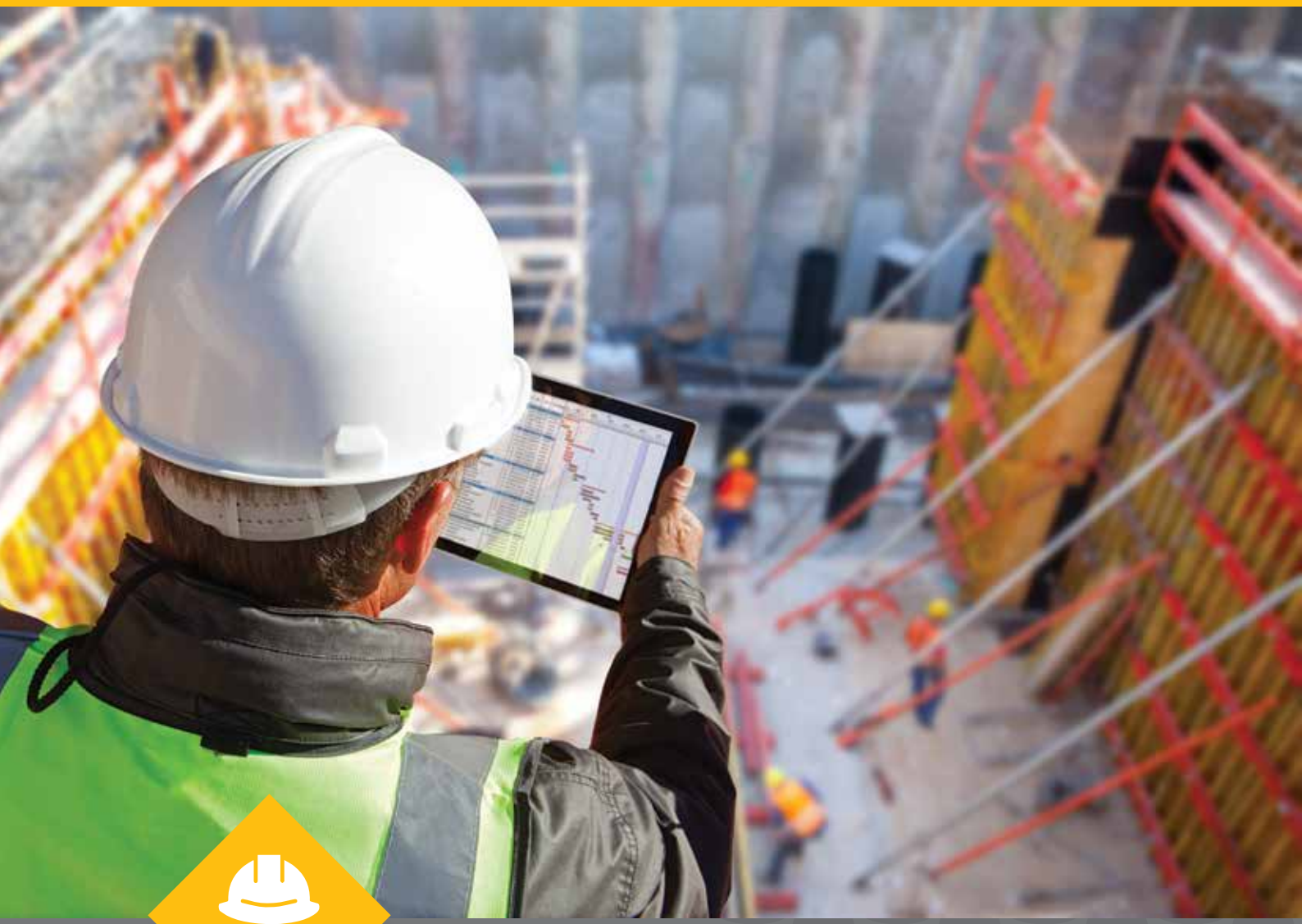
SCADA / Telemetry Networks

PBE offers a wide spectrum of systems that provide reliable, scalable and inherently flexible solutions to meet increasingly complex mandates. The modular SCADA based hardware can interface with Ethernet and RF networks ensuring seamless connectivity to existing infrastructure.

Fibre Backbone

PBE is a fibre network provider that has delivered a vast array of integrated tunnelling projects globally and offers custom solutions that are reliable, robust and easy to use. Rebroadcasting systems (LTE, FM, TETRA, P25, etc.), video monitoring and other real time control systems can demand high bandwidth and require low latency for operation.

PBE offers a wide range of fibre-based solutions, providing Ethernet over Fibre (EoF) and RF over Fibre (RoF) systems. ◆



SAFETY

Tunnel Safety Solutions

PBE Group designs, engineers and manufactures a suite of proprietary products for safety, data and communications that create an integrated solution in harsh tunnel construction environments.

PBE's products and solutions are sophisticated and reliable, with over 50 years of ensuring safer environments in challenging working conditions.

Manufacturer of over 70 proprietary products, meeting global regulations, PBE Group are supported and serviced by its 18 global sales and support offices and a vast network of distribution partners, enabling the provision of timely service and engineering support.



Real time data to improve safety

SAFETY SOLUTIONS FOR THE TUNNELLING INDUSTRY

Proximity Alert System (PAS)

PAS is a complete Proximity Detection and Collision Avoidance solution that allows seamless operation above and below ground, giving operators and pedestrians visual and audible warnings of impeding interactions and provides remote real time monitoring.



Units are available in a compact, ruggedized, explosion proof models and via a tablet-based radar type display. ◆

Tagging & Tracking

PBE's electronic tagging system is used for the tracking of personnel, vehicles and assets in tunnel environments.



This solution uses multiple technologies, increases situational awareness, minimising accident response times whilst promoting an overall safer workplace.

The system can be used in conjunction with the Proximity Alert System and also provides entry/exit functionality. ◆

Environmental Monitoring

PBE's Environmental Monitoring systems provide monitoring and concentration information for all common gasses in tunnel construction environments.



The system is monitored using PBE's own control and monitoring software, 'Vantage' allowing instantaneous alerts and providing a complete historical database.

The system can be combined with air velocity, tracking and temperature information and can form part of PBE's Responsible Ventilation solution. ◆

Responsible Ventilation

PBE's Responsible Ventilation (RV) platform provides significant cost saving and reduced environmental impact through control of auxiliary booster fans used in tunnel construction environments.



The RV management system controls these fans, operational only when required. These conditions can be triggered by environmental events such as unsafe gas levels and temperature, vehicles or personnel entering the area (tracking) or through specified scheduling ◆

Emergency Alerting Stations

An emergency alert response system is essential in a harsh construction environment. Alerting stations can provide audible and visual alerts in the case of emergency.



The PBE Evacuation and Alarming system consists of operator software and remote stations. The system can be configured to individual client operational requirements and can operate either autonomously or through dispatcher interaction. ◆

Positive Train Control (PTC)

PBE's PTC solution is a 220 MHZ band LTE based safety system designed to provide radio coverage in railroad tunnels that often presents a challenge especially for real-time safety critical applications.

PBE positive train control technology provides amplifiers to extend the coverage inside the tunnel. Remote monitoring and diagnostics are offered to view the status and health of the system. ◆



POWER

Tunnel Power Solutions

PBE designs, integrates, installs and services temporary high voltage equipment and infrastructure for the tunnelling industry on a sale or rental basis.

PBE Power manufactures and installs electrical power distribution equipment such as substations, switchrooms, distribution boards, HV cables, transformers etc.

PBE Group has invested in a fleet of power electrical equipment to provide our customers with hire options for their operations and projects and maintains a fleet of 1,200+ rental assets across global locations.

PBE has a Power Projects team that specialises in permanent infrastructure projects encompassing design, construction and commissioning of high voltage systems.



Miniature Tunnel Substation

POWER SOLUTIONS FOR THE TUNNELLING INDUSTRY

PBE Power Projects

PBE Power Projects specialises in delivering full turnkey high voltage permanent infrastructure projects.

These projects include the design, construction and commissioning of high voltage infrastructure including substations, switchyards and reticulation systems, construction of high voltage overhead power lines and the installation of underground cables.



Hiring of Power Equipment for Construction Projects



In addition to the design and supply of new power infrastructure, PBE provides customised solutions to meet temporary electrical power needs, providing a cost effective and minimal risk offering.

Our comprehensive range of specialised electrical equipment is designed to quickly and easily power up operations and projects. Our large global hire fleet is supported by our sales and service capabilities.



From building custom engineered substations to providing plug and play power cabling systems, our team understands the requirements for construction environments.

Specific Power Solutions

PBE offer the complete range of power solutions required in tunnelling and general construction for sale and hire including:

SUBSTATIONS

66/11kV Surface Transportable Substations

PBE provide a complete range of 66/11kV Surface Transportable Substations that are built to customer specifications.



Containerised Substations (CSS)

The CSS has been designed to operate at medium voltages for construction projects.

Compact Tunnel Substations (CTS)

The CTS has been built to operate at medium voltages for tunnel construction projects.

Miniture Tunnel Substations (MTS)

The MTS is ideal for tunnels that require voltages of 415V and 1000V.



CONTAINERISED SWITCHROOMS AND MOTOR CONTROL CENTRES

PBE containerised switchrooms have been developed to distribute all ranges of power for heavy industry, construction and tunnelling projects and operations.

Distribution Control Boards (DCB)

DCB's, lighting power distribution systems and ring main units are provided to support PBE's extensive range of power solutions.

Generators & Transformers

PBE can supply a comprehensive range of distribution and power transformers to customer specifications for either sale or hire.

Tunnel Lighting

PBE Tunnel Lighting Systems have been developed for the Tunnelling and Hard Rock Mining Industries. The lighting system complies with the requirements of BS 6164.

Cables & Couplers

PBE are specialists in providing plug and play cable packages that are ready to install on your project or operation. High voltage cables can be fitted to a wide range of coupler or junction box sizes to suit your load and voltages ranging from 3.3kV – 24kV couplers up to 800A.

PBE also provides reliable and robust medium voltage cable connections suitable for tunnelling construction. Ease of fitting and maintenance has been incorporated into our coupler design. ◆

PBE Group Company Overview

PBE Group ("PBE") provide an adaptive and flexible integrated solution where a reliance on safety and productivity is essential.

PBE is a true global systems provider for the mining, tunnelling, construction and associated markets. Our specialised engineering team integrates our industry specific manufactured products and best in class 3rd party products to ensure a sophisticated, robust and commercially viable solution.

Our growth in international markets is based on the key verticals of Technology, Power and Service Delivery – fundamental in any industrial project. Our experience in confined space and underground construction has enabled PBE to complete over 850 projects in more than 60 countries with 320 staff and 18 regional offices. ◆

PBE Technology

PBE Technology offers a suite of proprietary safety, data and communication products and systems that create an integrated Internet of Things (IoT) solution for use in harsh environments.

PBE manufacturers over 70 proprietary products, meeting global regulations in the mining, tunnelling and construction industries. Solutions include data and voice communications infrastructure, environmental monitoring, vehicle collision avoidance and proximity detection, tracking, emergency alerting systems, ventilation on demand and fleet management.

PBE Power

PBE Power designs, integrates, installs and services temporary and permanent high voltage equipment and infrastructure to the tunnelling and construction industries on a sale or rental basis. In addition, PBE Power (Projects) provides permanent power infrastructure for mines.

PBE's electrical power distribution equipment for construction projects include substations, switchrooms, distribution boards, HV cables, transformers etc. PBE Power also maintains a fleet of 1,200+ rental assets across global locations.

PBE Mine Services

PBE Mine Services is an electrical services business for the Australian mining industry, including the design and manufacture, testing, repair and refurbishment of low to high voltage electrical cables and couplers offered on a sale or rental basis.

In addition, PBE Mine Services offers for hire and sale flameproof and non-flameproof equipment such as substations, switchrooms, distribution control boards, auxiliary fans etc. for the Australian coal and hard rock markets.

Our growth...

in international markets is based on 3 key verticals which are fundamental in any industrial project:

- **Data & Communications Solutions**
- **Safety Products**
- **Power Solutions**

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