BLACK BOX

CASE STUDY
TRANSPORTATION



Keeping Rail Line Diagnostics on Track with a Future-Ready KVM Solution

BACKGROUND

As rail networks become increasingly dependent on data-driven maintenance and diagnostics, a leading public railway transport and infrastructure organization invested in four state-of-the-art diagnostic trains. Built by a manufacturer specializing in railway maintenance and diagnostic technologies, these vehicles feature advanced unmanned inspection systems and centralized data management platforms designed to support safer operations and smarter mobility.

CHALLENGE

The client needed a solution to enable seven operators to control and manage up to 24 systems throughout the four diagnostic trains. They required a resilient KVM switching system that could support high-quality 4K@60Hz video transmissions in an environment with strong electromagnetic interference. The KVM system should also provision for future migration to virtual machines.

Each diagnostic train is equipped with multiple specialized systems that continuously collect and process critical railway infrastructure data. To operate these systems efficiently, seven operators needed the ability to monitor and control up to 24 different systems across the four vehicles.

The manufacturer was looking for a resilient KVM solution capable of:

- High-quality 4K@60Hz video performance
- Operating reliably in environments with significant electromagnetic interference (EMI)
- Simplifying operator workflows by enabling centralized access to multiple systems
- Supporting future migration to virtual machines
- Centralized management and monitoring of the entire deployment

The solution needed to be robust, scalable, and ready to evolve alongside the customer's future technology requirements.

SOLUTION

Black Box designed and deployed an Emerald® KVM ecosystem tailored to the unique demands of the railway environment. Most operator workstations were configured with dual monitors, enabling users to control two computers from a single keyboard and mouse. Emerald 4K transmitters and receivers connected operators to systems across an EMI/RFI-resistant fiber-optic network, ensuring reliable performance and uncompromised video quality even in challenging operating conditions.

At the core of the deployment, Emerald network switches provided secure and efficient connectivity between systems and users, while Boxilla® centralized management delivered complete visibility and control through an intuitive administration interface. This enabled administrators to easily configure, monitor, and manage the entire KVM environment from a single platform.

Importantly, the Emerald architecture was designed with the future in mind. Native support for virtual machine access means the customer can transition to virtualized environments when required — without investing in additional Emerald hardware or redesigning the system.

To further simplify deployment, Black Box also supplied and installed the complete fiber-optic cabling infrastructure, providing the customer with a single trusted partner for the entire project.

RESULTS

The deployed solution delivers the stability, performance, and reliability required for mission-critical railway diagnostics. Operators benefit from seamless access to multiple systems, while administrators gain centralized control and simplified management.

The customer particularly values the system's flexibility, scalability, and future-proof design. Equally important, the manufacturer now has a standardized and repeatable solution that can be replicated for future railway diagnostic train projects worldwide, accelerating deployment and ensuring consistent performance across global installations.

By combining resilient fiber-based KVM technology with centralized management and built-in virtualization readiness, Black Box helped create a reliable platform for next-generation railway diagnostics — supporting safer rail operations today while preparing for the smart mobility demands of tomorrow.