

Mobile Power Supporting 200-Year Bridges | Personal Energy Operating for 12 Years on the Honshu-Shikoku Bridges

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Overview

Personal Energy was implemented on mobile maintenance platforms for the Honshu-Shikoku bridges as a hybrid on-grid/off-grid mobile power system that reduces dependence on trolley-wire infrastructure. Eleven IP65 salt-resistant units delivered in 2013 and 2014 have remained in service, with required inspection and maintenance, for 12 years through 2026 in a harsh marine environment.

Case Answer

Reduce trolley-wire infrastructure by moving the power source with the maintenance platform

Mobile maintenance platforms used to inspect and repair long-span bridges carry workers and equipment to locations that are difficult to reach with ordinary scaffolding, including the underside of the bridge and inside girders. Reliable operation therefore requires continuous power for traction motors and work equipment.

With conventional trolley-wire power supply, long runs of supply conductors, current-collection equipment, and wiring must remain installed as fixed infrastructure on the bridge. In a marine environment, salt, high humidity, rainwater, vibration, and wear make that power-supply infrastructure itself a maintenance target requiring inspection, replacement, and work at height.

For this project, the power source was installed on the maintenance platform rather than kept entirely on the fixed-infrastructure side. The system is charged from an external source in normal conditions and operates independently from stored energy while moving and working. This hybrid on-grid/off-grid architecture reduces dependence on fixed power-supply equipment by moving the power source with the load.

A total of 11 units were delivered in 2013 and 2014: three 2kW / 200V systems with 7.2kWh storage and eight 3kW / 200V systems with 4.8kWh storage, built to an IP65 salt-resistant specification. With the required inspection and maintenance, they have remained in service as power sources for mobile maintenance platforms for 12 years from the 2014 delivery through 2026.

Scope

- Mobile maintenance platforms used to inspect and repair long-span bridges
- Bridge-maintenance equipment used over the sea and at height
- Mobile equipment for which fixed-wiring maintenance creates a large burden

Constraints

- Operation in a marine environment with salt exposure, high humidity, rainwater, and vibration
- Supply 200V loads while moving together with the maintenance platform
- Reduce the inspection and replacement scope of fixed power-supply equipment such as trolley wires and current collectors
- Support long-term operation with a configuration that allows required inspection and component replacement

Evidence / References

Kei Communication Technology Inc., “ Notice of Personal Energy Delivery for Honshu-Shikoku Bridge Expressway Company ” (November 1, 2014; Japanese)

Supports: Delivery for mobile maintenance platforms, 11 units in total, output and storage capacities, and salt-resistant specification

Honshu-Shikoku Bridge Expressway Company, “ Long-Span Bridge Maintenance Technology (Maintenance Equipment) ” (Japanese)

Supports: The role of maintenance equipment supporting inspection and repair of long-span bridges

Honshu-Shikoku Bridge Expressway Company, Honshi Technical Report, Vol. 48, No. 140 (Japanese)

Supports: Public information on maintenance and preservation technologies for the Honshu-Shikoku bridges

Kensetsu no Kikaika, “ Mechanical Equipment for Long-Span Bridge Maintenance ” (Japanese)

Supports: Technical reference on mechanical equipment used to maintain long-span bridges

Original Source

<https://www.ieee802.co.jp/cases/case-004-honshu-shikoku-bridges-en.php>

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