The most important mission of Honshu-Shikoku Bridge Expressway (HSBE) is to play the roll as an artery in Setouchi (Seto Inland Sea) region, through effective maintenance of long-span bridges including the Akashi-Kaikyo Bridge, the world-longest suspension bridge for more than 200 years.

**Technology Development**

HSBE is continuously working on technology development for effective and economical maintenance of the bridge assets.

**Non-destructive inspection for suspender ropes**

By measuring the amount of magnetic flux along the magnetized suspender rope, reduction of cross section is estimated.

**Detection of fatigue cracks by infrared thermography**

By measuring temperature gap through infrared camera, fatigue cracks in the welding connection of steel deck are detected.

**Cable dehumidification system**

By injecting dry air into cable, corrosion of the main cable is prevented.

**Inspection by robot and drone**

Inspection technology is being developed for efficient inspection of massive structures.

**Maintenance Technology of Honshu-Shikoku Bridges**

-Long-span bridges for more than 200 years-

HONSHU-SHIKOKU BRIDGE EXPRESSWAY COMPANY LIMITED

https://www.jb-honshi.co.jp/english/
Current situation and problem of expressways

- At least 40% of the total expressways-length has been operated for more than 30 years and because of this, the expressways are seriously deteriorated.

- At least 40% of the total bridge-length and 20% of total tunnel-length were also constructed more than 30 years ago and they are facing increased risk by the aged deterioration.

- The total vehicle weight is increasing with the increase in the number of large-scale vehicle on the expressways. The expressways are under severe conditions such as increasing in the usage of anti-freezing agent (NaCl) and the increase in the amount of extreme rainfall for a short time.

Severe environment in snow region

Damaged Condition

Concrete cracks and float

Concrete free lime
Expressway Renewal Project
التجميد

Severe deterioration on slab lower surface

Large-scale renovation for bridges
e.g. Replacement of RC concrete slab with PC precast slab

Open to Traffic (1963)
Deteriorated Structure (2014)
Undergoing Renewal Works (2019)
Renewed Segment (planned in 2026)
Digital camera/video camera system - Crack inspection:
High definition images taken by digital camera or video camera makes it possible to inspect the surface of a structure in the same way as the close visual inspection. Through a computer analysis of the images, the cracks are automatically detected.

Infrared Camera System – Delaminations/spill inspection:
The infrared camera system takes images which is analyzed automatically and displays the damage level in three stages. Because damages are objectively analyzed by software, bias or oversight in measuring caused by skill difference can be prevented. In addition, this system helps to create a research report since the detected results are easily captured on spreadsheets or word processing software. This system has gotten track records in the U.S.
The Great Hanshin-Awaji Earthquake occurred in January 1995, took precious lives and destroyed cherished livings of local communities. Earthquake Museum conveys how Hanshin Expressway responded in the 623 days to complete the restoration of the expressway system. It displays damaged structures and introduces new technologies and various activities which put into practice based on the lessons including disaster management support and educational assistance for disaster prevention.

Immediately after the Surugawan earthquake, NEXCO-Central started emergency checkup and stopgap recovery, and 4 days later, finished temporary recovery for general traffic.

Use of rest areas as disaster-management bases

In the Great East Japan Earthquake, the Self-Defense Forces and firefighters heading to stricken areas used expressway rest areas as relay and support bases. Based on this experience and various issues, authorities are bolstering their disaster-response capabilities across Japan to respond effectively and efficiently to emergencies, using Moriya SA on the Joban Expressway as their model.

The recovery of the Tomei expressway in Makinohara area

I immediately after the Surugawan earthquake, NEXCO-Central started emergency checkup and stopgap recovery, and 4 days later, finished temporary recovery for general traffic.
Japan’s Expressways are built and operated by six companies. The total length in operation is 10,351km, and 331km is under construction.

**West Nippon Expressway Company Limited**
- Head Office: Osaka
- Expressways in Operation: 3,533km
- Traffic Volume: 2.95 million vehicles/day
- Toll Revenue: US$ 7.1 billion
- Expressway under construction: 72km

**East Nippon Expressway Company Limited**
- Head Office: Tokyo
- Expressways in Operation: 3,943km
- Traffic Volume: 2.95 million vehicles/day
- Toll Revenue: US$ 7.82 billion
- Expressway under construction: 75km

**Hanshin Expressway Company Limited**
- Head Office: Osaka
- Expressways in Operation: 250.4km
- Traffic Volume: 0.72 million vehicles/day
- Toll Revenue: US$ 1.7 billion
- Expressway under construction: 34.2km

**Central Nippon Expressway Company Limited**
- Head Office: Nagoya
- Expressways in Operation: 213.2km
- Traffic Volume: 1.98 million vehicles/day
- Toll Revenue: US$ 6.3 billion
- Expressway under construction: 132km

**Honshu-shikoku Bridge Expressway Company Limited**
- Head Office: Kobe
- Expressways in Operation: 172.9km
- Traffic Volume: 0.12 million vehicles/day
- Toll Revenue: US$ 0.6 billion
- Expressway under construction: 34.2km

**Metropolitan Expressway Company Limited**
- Head Office: Tokyo
- Expressways in Operation: 320.1km
- Traffic Volume: 1.02 million vehicles/day
- Toll Revenue: US$ 2.4 billion
- Expressway under construction: 17.5 km

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**Note:** Revenue is for the year ended March 31, 2019 and calculated by the exchange rate of 110 JPY for 1 US$. As of JULY 1st, 2019.