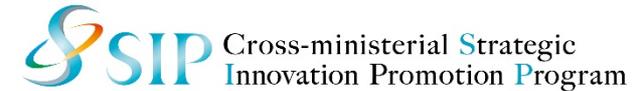


- **R&D Topics: Asset Management Technologies**
- **R&D Theme: Global R&D on the management cycle of road infrastructures**
- **Principal Investigator: Koichi Maekawa (Professor, The University of Tokyo)**
- **Collaborative Research Groups:** Nihon Univ., C.E.Management Integrated Laboratory Co., Ltd., NIPPO Corp., East Nippon Expressway Co., Ltd., Metropolitan Expressway Co., Ltd., Yokohama National Univ., Tohoku Univ., Kyoto Univ., Osaka Univ., Kochi Univ. Tec., National Inst. Tec. Kochi Col., Tokyo Inst. Tec., Tsukuba Univ., JSCE, Hokkaido Univ., Shutoko Eng. Co. Ltd., Highway Tec. RC, Kyushu Univ.



R&D Objectives and Subjects



Objectives

R&D of Innovative hardware and software: We are developing various technologies to reduce the life cycle cost of road infrastructures. Our research covers whole maintenance processes such as Inspection, Performance verification, repair & strengthening and renewal.

R&D of management system: We are also developing a maintenance system for infrastructures in municipalities.

Implementation at home and abroad is our final goal. Developed technologies are implemented for domestic road infrastructures and municipalities. The scheme will be prepared to export the developed system.

Subjects

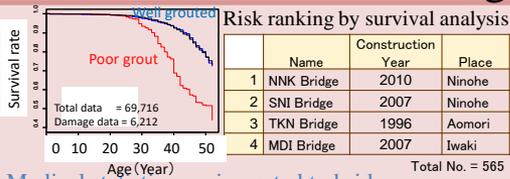
Key technologies for road maintenance: 3-D radar, Multi-scale simulation, Data assimilation, Survival analysis, Durable bridge decks, Water jets, Surface finishers, Water proofing material, Pre-cast bridge decks, Quality control system

Maintenance system for administrator: Asset management system, Management database, Education system, PDCA cycle of maintenance, Bidding model & Contract model, Business model

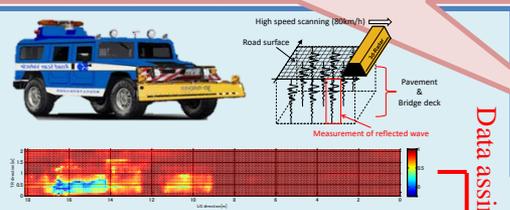
Exportation: Preparation of ISO on the maintenance of concrete structures, Formulation of international hubs in other Asian countries, Information transmission

Current Accomplishments (1/2)

R&D of various technologies for bridge decks



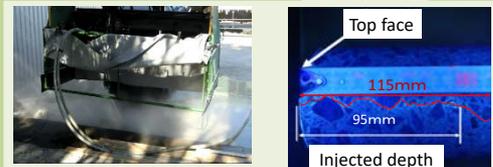
Medical statistics are imported to bridge inspection
Priority is explained by risk analysis



High speed scanning with 3D radar. Signal analysis finds damage inside bridge decks.

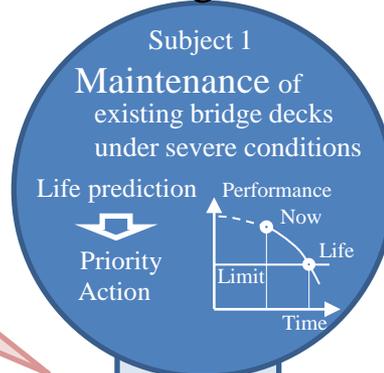


Remaining life prediction by data assimilation



Effective & quiet Water-jet machine

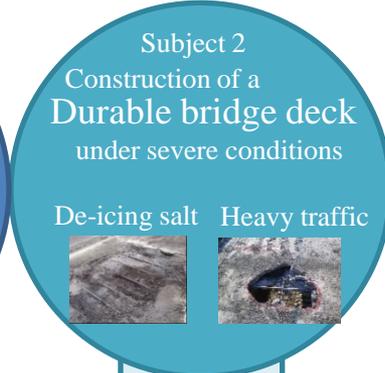
Water proof material of high penetration



- Inspection data analysis
Survival analysis (UT)
- NDT
3D radar (CEDK, UT)
- Evaluation
Multi-scale analysis (UT)
- Repair
Water jet (NIPPO)
Water proof material (Shutoko)
- Implementation
Cold area (NEXCO-e, MLIT)
Heavy traffic area (Shutoko)

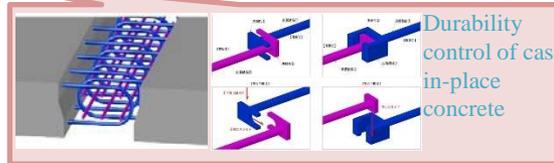
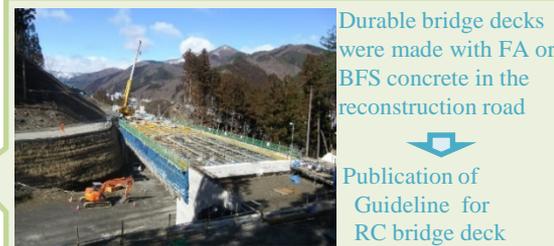
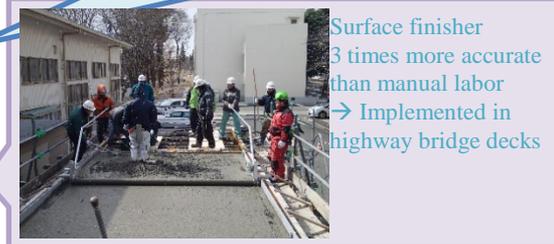
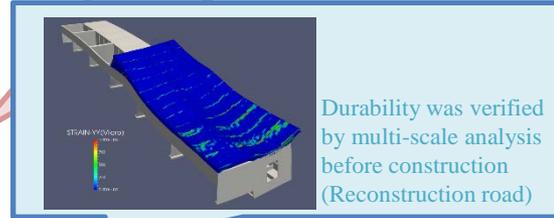
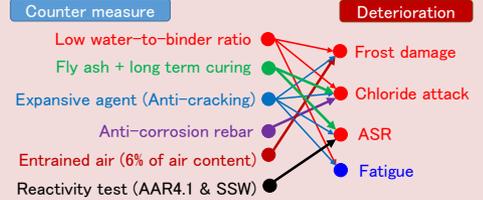
Fruit

Effective maintenance of bridge decks



- Durable material
Supplemental material (UT, NU) (fly ash, BFS, expansive agent)
- Durability design
Multi scale analysis (UT)
- Construction accuracy
Surface finisher (NIPPO)
- Quality verification
Surface absorption test (NUT)
- Implementation
【New】 Recovery from earthquakes in Tohoku and Kumamoto (MLIT, KU)
【Renewal】 Precast PC deck (NU)

Durability design with fly ash and blast furnace slag



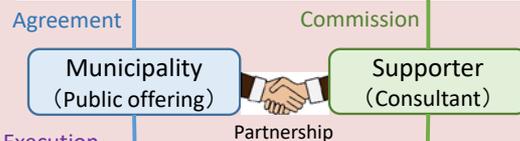
R&D of Maintenance systems for road administrator and municipalities

Asset management system for road administrator

- Kyoto model (Pavement & Bridges) → Installed in Kyoto pref. & Vietnam
- Osaka model (Bridges) → Used in Hanshin Expressway Co., Ltd.
- Kochi model (Bridges) → Installed in Kochi pref. & Indonesia

Bidding and contract system for municipalities

OPCET, JSCE
Research committee on the implementation of asset management system



The academic society supports the installation of asset management in municipalities

Support, analysis

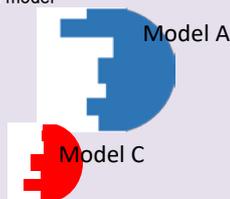
① Self-Diagnostic

→ Surveying the environment, infrastructures and organization



② Collaboration model with the private sector

→ Select optimum model



③ Adjustment of interface by improving the organization or bidding & contract system

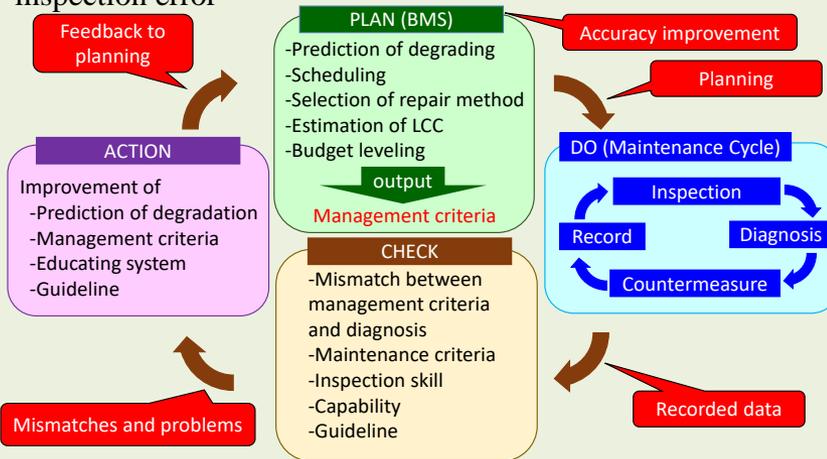
→ Starting the asset management efficiently

④ Construction of the sustainable asset management system



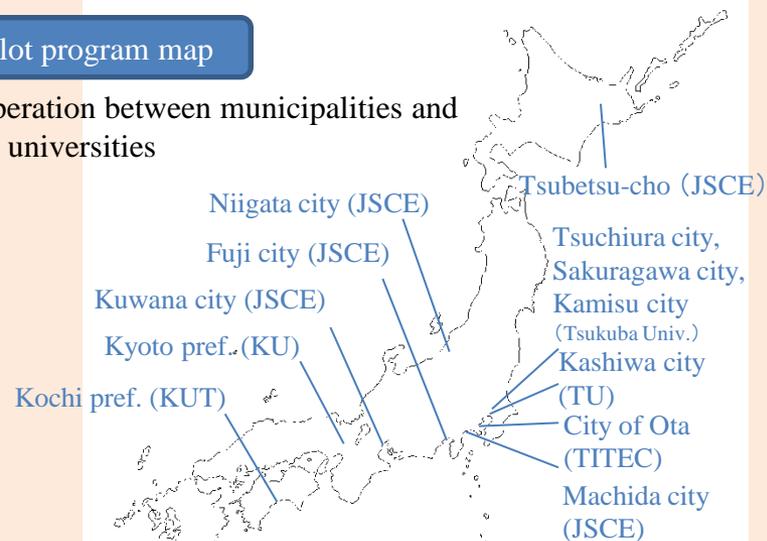
Kaizen cycle in maintenance

Improvement in education & inspection system to reduce inspection error



Pilot program map

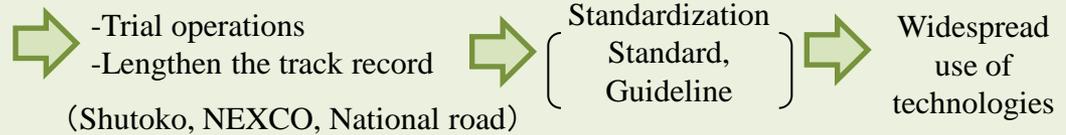
Cooperation between municipalities and local universities



Implementation at home and abroad

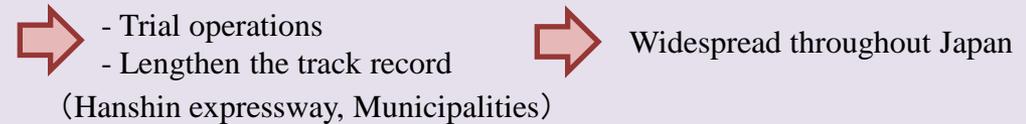
Cutting edge technologies for the maintenance of road infrastructures

- 3D radar
- Multi scale analysis
- Data assimilation
- Survival analysis
- Durable bridge decks
- Water jet machines
- Water proof materials
- Surface finishers
- Water absorption tests
- Quality control systems



Maintenance system for road infrastructures

- Asset management
- Bidding & Contract system
- Kaizen cycle
- Education
- Analysis
- Database



International hubs in Asia (Hokkaido Univ., Tokyo Univ.)

	~2015	2016
Thailand	 Seminar -SIP office was opened	 Inspection
Vietnam	 Seminar Educational tour	 Lectures about the maintenance in University
Myanmar	 Inspection Monitoring	 Bridge database
Cambodia	 Seminar, Inspection demonstration	 Translation of Japanese standards

Exportation of SIP technologies

