Management Philosophy and Vision

Value Creation Strategy

Building Sustainability Management Base

Creating a Nature-Rich Environment

Affiliating with Society

Promoting Effective Governance

Data Section

Special Feature: DX Initiatives

# A Total System for Maintenance and Management of Port Structures

》 Development of a total system for the maintenance and management of port structures utilizing 3D image processing and AI

Aiming to contribute to the development of sustainable, appealing and resilient national land, POC is promoting the application of DX to respond to the aging of port structures. In this context, we have developed a new total system for maintenance and management through collaborative development with the National University Corporation Tokyo Institute of Technology. For this technology, we received the National Land Technology Development Award (Excellence Award) for the year 2022.

Overview of technologies

● **Combining five technologies to make up a total system for the maintenance and management of port structures**

(1) A technology that precisely models the geometry of the target structure in 3D using a series of photographs of the underside concrete of a pier structure

3D modeling with AI

Sequential photographs of the underside concrete of a pier superstructure

3D model created from continuous shooting by AI
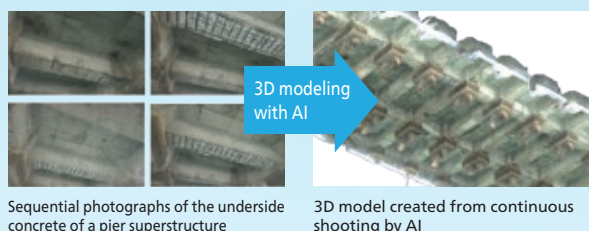
(2) An AI-based image processing technology to automatically extract cracks and rust juice from filmed images

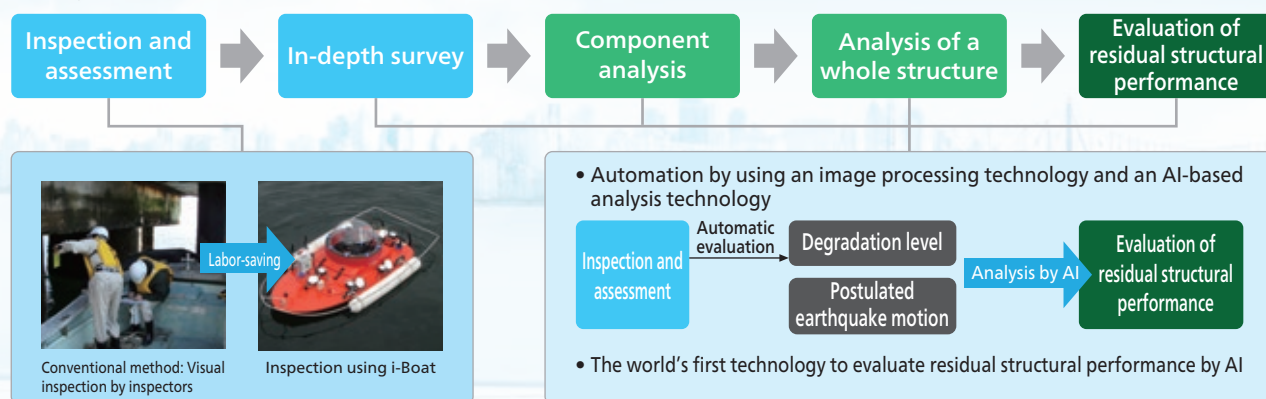Extracting damages using AI

Filmed image

Damages extracted by AI

(3) A technology to automatically determine the degradation level of each component by AI in conformity to the Guidelines for Inspection and Diagnosis of Port Facilities (Ministry of Land, Infrastructure, Transport and Tourism)

(4) AI-powered technology that predicts how and where the pier structure's deteriorating concrete will be damaged during an earthquake and displays the results

(5) A technology to predict future age-related deterioration in five years, ten years, etc.

● **Automation and labor saving of the entire process by ensuring consistent operation from inspection to the evaluation of residual structural performance**

⇒ Reducing time and costs by about 90% compared with the conventional technique

⇒ Helping facility managers to draw up more systematic maintenance program by providing rational benchmarks to determine the extent of damage of a pier in the event of an earthquake, as well as the optimal level and timing of repair and reinforcement work

Inspection and assessment → In-depth survey → Component analysis → Analysis of a whole structure → Evaluation of residual structural performance

Labor-saving

Conventional method: Visual inspection by inspectors

Inspection using i-Boat

• Automation by using an image processing technology and an AI-based analysis technology

Inspection and assessment → Automatic evaluation → Degradation level / Postulated earthquake motion → Analysis by AI → Evaluation of residual structural performance

• The world's first technology to evaluate residual structural performance by AI

Future development

● **Participation in the third phase of the Strategic Innovation Promotion Program (SIP)***
(The third phase of SIP: Creation of smart infrastructure management system)

We will promote widespread application of this system as a maintenance and management technique for port managers across the nation in the coming years.

* Cross-ministerial Strategic Innovation Promotion Program.
A national project led by the Cabinet Office to realize scientific and technological innovation. In this project, the Council for Science, Technology and Innovation (CSTI) plays a commanding role for management beyond the boundaries between government ministries and agencies as well as conventional fields and sections.