

[Foundation Strategies]

Technological Strategy

[Technical research and development and to realize Vision 2030](#) ▼

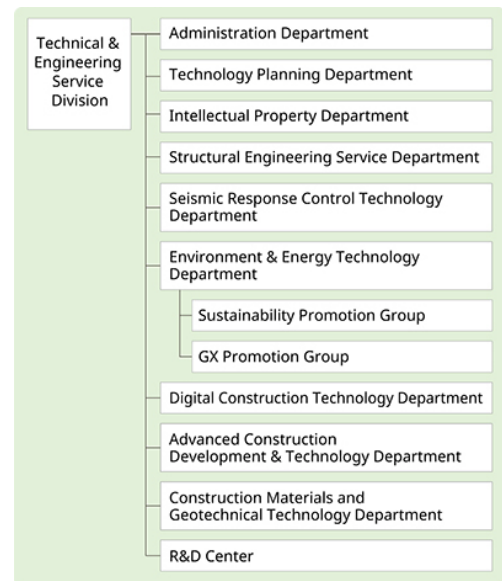
[Major technical research and development achievements in fiscal 2020 and major efforts in fiscal 2021](#) ▼

[Applications of technical research and development](#) ▼


Technical research and development and to realize Vision 2030

To become carbon neutral by 2050 and create a sustainable society, we promote the acceleration of changes in technical research and development, and plan, apply, analyze, expand, (and improve) new technical research and development, based on the basic policies for the Medium-term Management Plan 2019–2021. We reorganized the Technical & Engineering Service Division in April 2021 to promote technical research and development that meets the needs of on-site work in a flexible and speedy manner. We have established a Sustainability Promotion Group and GX* Promotion Group to help address climate change risks and create a sustainable society such as renewable energy. We have also proceeded with a plan for constructing a new research facility for the purpose of improving and expanding the testing function of the R&D Center.

* GX (Green Transformation): shifting to green energy that does not emit greenhouse gases enables to reform the industrial structure, society and economy, contributing to growth.



To Realize Vision 2030

We will promote the enhancement of technology to develop [SMile Construction System \(Japanese only\)](#)  and peripheral services, aiming to become a construction company that globally supports and connects people and communities with new value.

(1) Technical research and development to develop SMile Construction System

Development of DX-related technologies including 3D design/construction plan based on BIM/CIM and the next-generation construction system with ICT

(2) Development of unique sustainable technologies and services

Development of sustainability transformation (SX)-related technologies including sustainable technologies that help create a sustainable society from the three aspects of the environment, society and economy, such as the use of environmentally friendly materials and construction methods and the long operating life of structures







(3) Strengthening of foundations for technical research and development

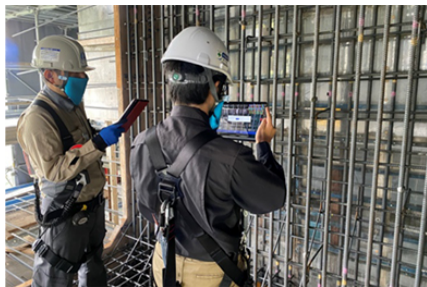
Strengthening of the marketing function and the promotion of management and effective use of intellectual property

Major technical research and development achievements in fiscal 2020 and major efforts in fiscal 2021

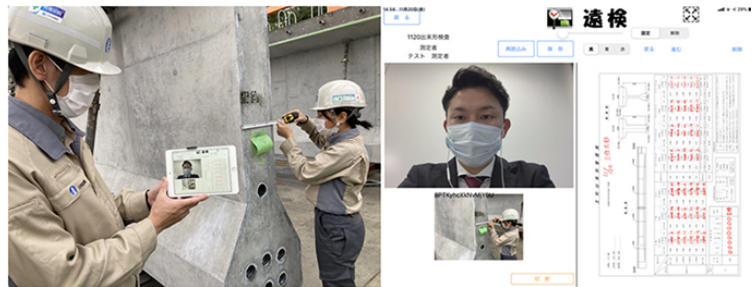
Major achievements in fiscal 2020

(1) Technical research and development to develop SMile Construction System

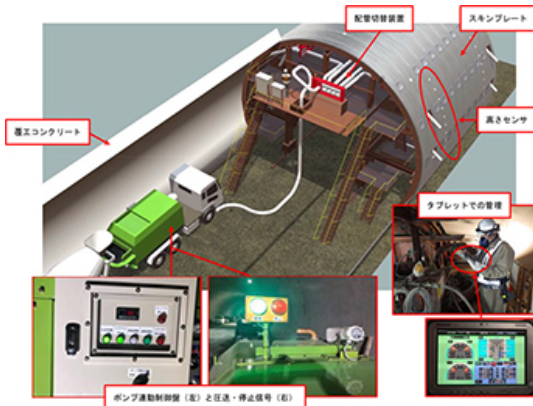
- [On-site introduction of the real-time automatic system to inspect complete reinforcing bar shapes \(Japanese only\)](#), 
- [Development and application of EnKen™, a remote inspection system that increases the efficiency of operations on both ends of the contractee and us \(Japanese only\)](#), 
- [Development and application of SMC-Slab, a design support program for replacement work of bridge floor slabs \(Japanese only\)](#), 
- [Improvement of the SMC-Tunneling series “Automatic de Lining” \(Japanese only\)](#), 
- [Development and application of GENESIS/FHQ, a cloud system that monitors a wide range of ground behavior \(Japanese only\)](#), 
- [Development of MOLE-FCM, a system that creates a net of a cracked part of an aqueduct tunnel and other structure \(Japanese only\)](#), 



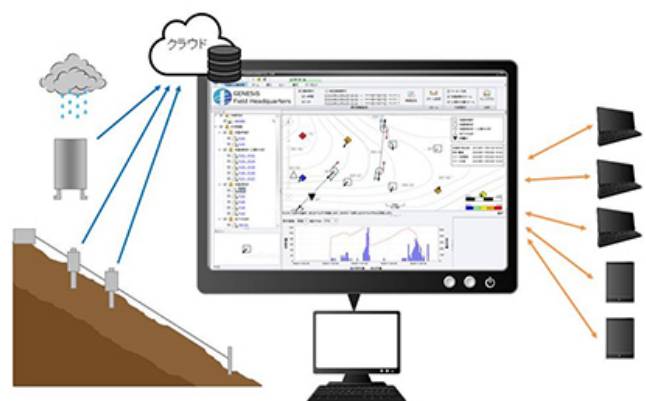
Real-time automatic system to inspect complete reinforcing bar shapes



EnKen™, a remote inspection system








SMC-Tunneling series “Automatic de Lining”



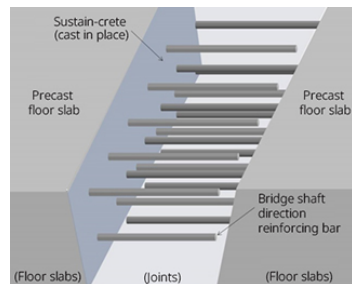
GENESIS/FHQ, a ground behavior monitoring system

(2) Technical research and development of unique sustainable technologies and services

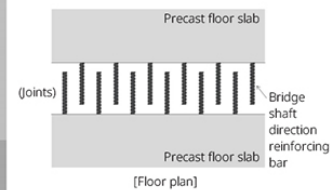
- [Completion of the main line bridge of an expressway that adopted Dura-Bridge®, a high-durable bridge \(Japanese only\).](#) 
- [Development of Sustain-Joint®, new joining construction method for precasting floor slabs \(Japanese only\).](#) 
- [Launch of co-development of 200-meter tower for wind power generation and machinery for constructing the tower \(Japanese only\).](#) 
- [Development of Instant Anomaly Detection System using wireless vibration sensors \(Japanese only\).](#) 
- [Development of a joystick displacement sensor that measures the moves of a seismic isolation building when an earthquake hits \(Japanese only\).](#) 






Dura-Bridge®, a high-durable bridge

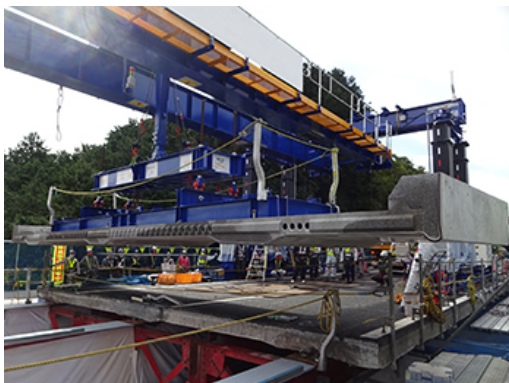


"Sustain-Joint®"

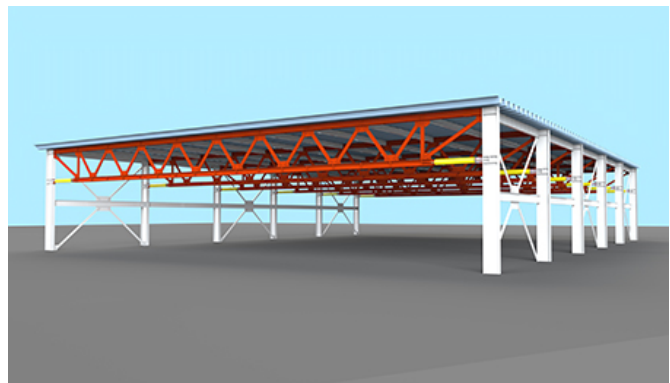


(3) Other technical research and development

- [Development and application of a new floor slab construction machine to reduce labor and manpower in floor slab replacement work \(Japanese only\).](#) 
- [Establishment of a design method for application on actual properties of the damage control type truss beam construction method RAIJIN™ \(Japanese only\).](#) 
- [Smaller and lighter Resonance Crown Silencer®, a portable noise reduction device \(Japanese only\).](#) 



Floor slab construction machine



Damage control type truss beam construction method RAIJIN™


Major efforts in fiscal 2021

(1) Technical research and development to develop SMile Construction System

- Construction management and quality control technology using ICT
- Technology for mechanization and automation of construction, helping improve productivity
- BIM and CIM technologies related to design, manufacturing and construction
- Management technology in the production process


(2) Technical research and development of unique sustainable technologies and services

- Technology to improve building sustainability
- Technology for renewable energy applications
- Technology related to low carbon
- Technology related to the value creation of new materials
- Technology for disassembly of structures
- Technology related to resilience of structures

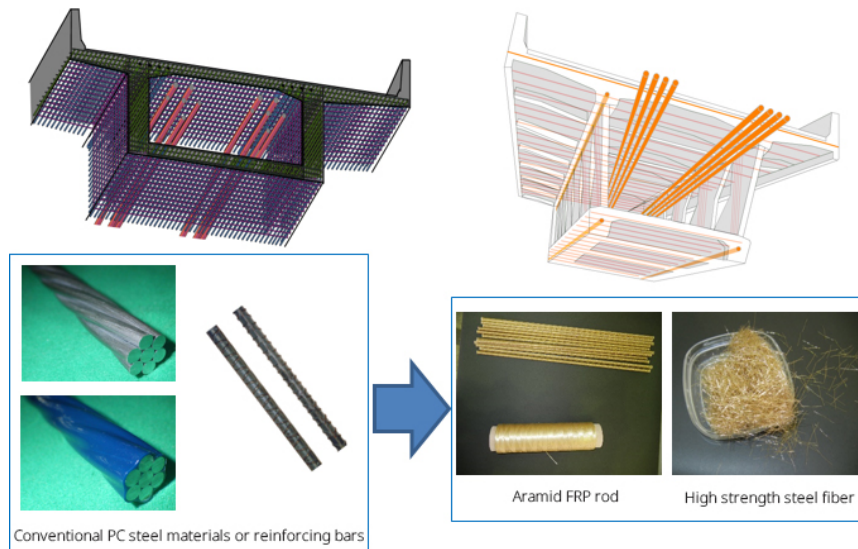
(Reference) You can find more information on our technology (available in English) by clicking [here](#)  .

Applications of technical research and development

Dura-Bridge®, a high-durable bridge

[Dura-Bridge® \(Japanese only\), a high-durable bridge](#)  , is a PC bridge that uses ultra-high strength fiber-reinforced concrete and corrosion-resistant aramid FRP rods for tension materials. Since 2010, we have jointly researched* into the development of high-durable bridge using new corrosion-resistant tension materials in place of reinforcing bar and PC steel materials. This technology will prevent damage to a third party due to falling pieces of concrete caused by corrosion of materials such as reinforcing bar and PC steel materials. The technology is also intended to improve durability, allowing a reduction in the human and economic burden on future maintenance and management.

* Co-research with West Nippon Expressway Company Limited



We have verified structural performance by conducting different types of testing such as element testing on materials and the structure and driving testing with actual wheel loads. We have also constructed a demonstration bridge and verified workability and safety using the demonstration bridge as a road for construction work for two years. Based on such verification results, Dura-Bridge® was adopted for a newly constructed bridge structure.



Shear strength testing of joints



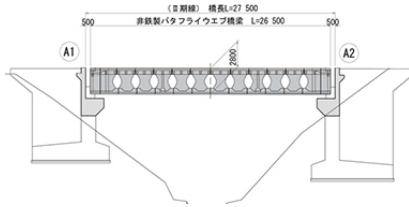
Driving testing with wheel loads on floor slabs



Crane load testing on the demonstration bridge

Structure with Dura-Bridge®

Dura-Bridge®, a high-durable bridge, was adopted for the Bessodani Bridge, part of the project to add a lane launched on the Tokushima Expressway (between the Donari exit and Wakimachi exit). We manufactured several precast segments at a factory, transported them to the site, and constructed the bridge.



Bridge structure



Construction of precast segments



Completion