Corporate Profile

IHI Infrastructure Systems Co., Ltd.

IHI Realize your dreams

"Contributing to the development of society through tech nology"

"Human Resources is the only and the largest asset of the company"

Tatara Bridge

Introduction

Under the IHI Group management principles, "Contributing to the development of society through technology" and "Human resources is the only and the largest asset of the company.", IHI Infrastructure Systems Co., Ltd. has mobilized excellent human resources and high technological capabilities, backed by abundant experience, and pushed forward with the aim of providing high-quality social capital which accommodates the needs of society at the same time as being safe and reliable.

As well as constructing and repairing bridges and floodgates both in Japan and abroad, as a countermeasure to facility obsolescence and from the perspective of operation and maintenance, we will join our affiliate, IHI Construction Service Co., Ltd., in focusing on the inspection, diagnosis, large-scale modification, renewal, etc. of bridges and floodgates, the needs for which are set to intensify, and strive to strengthen our efforts, expand our business and fulfill our mission.

Furthermore, we would like to disseminate our design/production/construction technologies accumulated over years of experience both in Japan and abroad, aim to participate in the concession business and develop overseas strategical bases in Asia, Europe and the U.S. in our desire to significantly boost the development of a global society.

As well as steel structures such as bridges and floodgates, we will also focus our strengths on providing products and services such as seismic isolation and vibration damping systems for buildings to enable safe, secure and comfortable lifestyles.

IHI Infrastructure Systems will ensure compliance and proactively reform working styles, with both its executives and employees alike standing in solidarity to achieve our ultimate goal of promoting regional development as a member of society through activities related to safety and health, environmental management activities and so on.

Takeshi Kawakami
President

Realize your dreams

Company profile / Organization / History

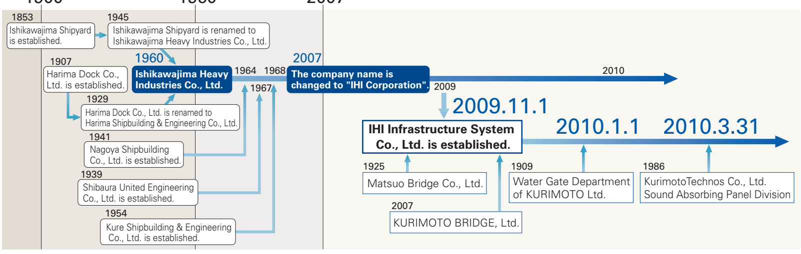
■ Company profile

Name:	IHI Infrastructure Systems Co., Ltd.
Head office:	3-banchi, Ohama-nishimachi, Sakai-ku, Sakai city, Osaka 590-0977 Japan TEL:+81-72-223-0981 FAX:+81-72-223-0967
Capital:	1,000 million yen
Representative:	President Takeshi KAWAKAMI
Employees:	799 (as of April 2017)
Year of establishment:	November 1, 2009
Business activities:	The design, fabrication, construction, assessment,repair and maintenance of bridges, gates and various other steel structures. The fabrication, sales and installation of disaster prevention equipments.

■ Organization

- Board of Directors
- President
  - Internal Control Audit Dept.
  - Health, Safety & Environment Dept.
  - Quality Assurance Dept.
  - Administration, Human Resources & CSR Dept.
  - Corporate Planning Dept.
  - Finance & Accounting Dept.
  - Procurement Dept.
  - Overseas Project Div.
    - Management Dept.
    - Engineering Dept.
    - Turkey Project Dept.
    - Asia Project Dept.
  - Sales Headquarter
    - Sales Administration Dept.
    - Bridge Project Planning Dept.
    - Domestic Sales Dept.
    - Tokyo Sales Dept.
    - Steel Structures Dept.
    - Overseas Sales Dept.
    - Sales Offices
  - Bridge Engineering Div.
    - Bridge Engineering Dept.
    - Urban Expressway Dept.
  - Steel Structure Engineering Div.
    - Planning & Control Dept.
    - Gate & Penstock Design Dept.
    - Gate & Penstock Construction Dept.
    - Vibration Project Dept.
  - Research & Development Dept.
  - Construction Dept.
  - **Sakai Works**
    - Production Management Dept.
    - Production Dept.
    - Quality Control Dept.
    - Yokohama Production Dept.

■ History



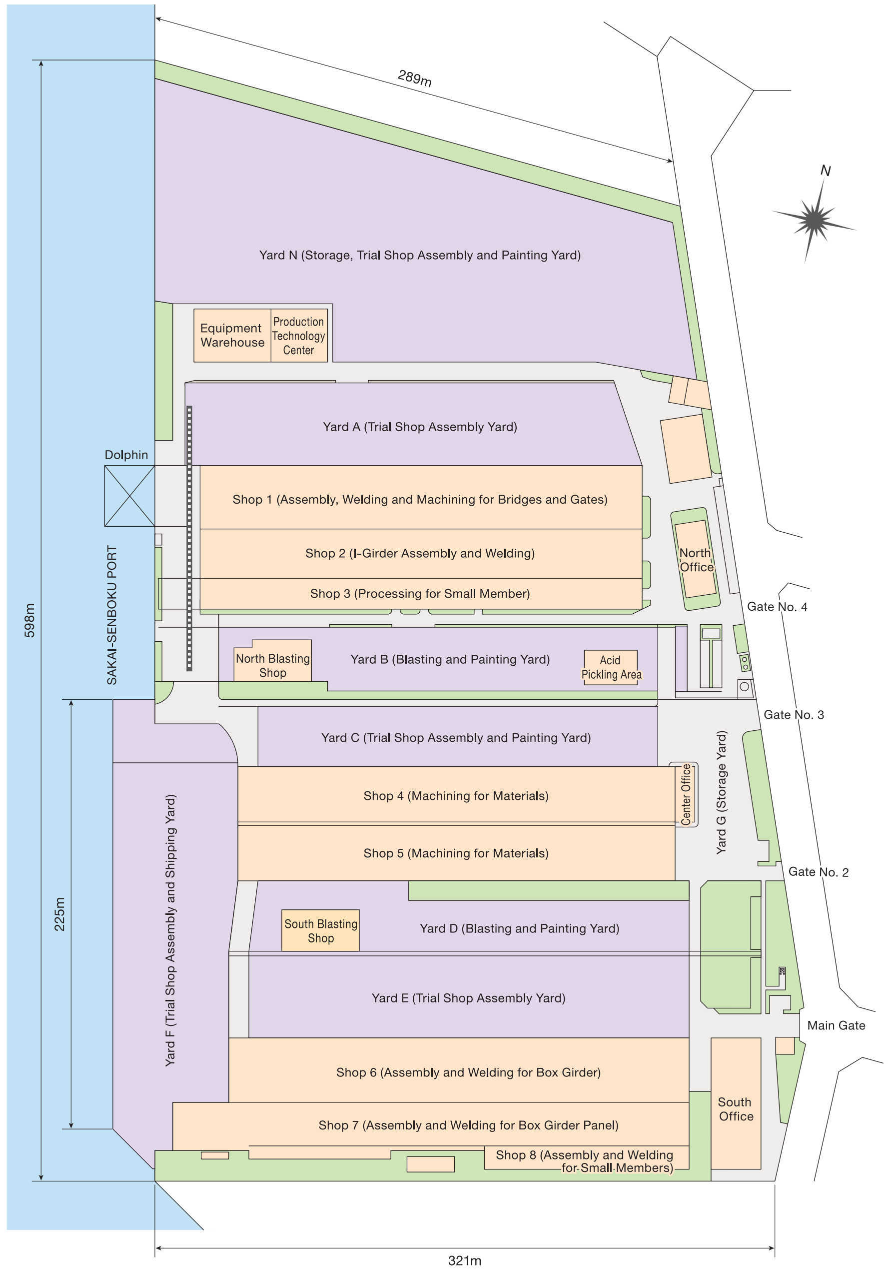
(Head office / Sakai Works on March 2013)

Sakai Works

Facing the Sakai Senboku port in the Sakai coastal industrial area, the Sakai Works occupies its lot area of approximately 174,745 m^2. This location is suitable for fabrication, trial assembly and shipping of large-scale structures.

Sakai works consists of 8 major shops with several equipments, such as large horizontal boring machine, NC machines including an NC primer remover, NC marking and plasma cutting machine, NC laser combination boring machine and NC gantry drilling machine, an automatic panel production line for box-girders, and a steel girder production line to build large blocks up to 120 tons indoors. With two 100-ton gantry cranes in a wharf yard located along the shore, 51m wide and 225m long, the plant can erect blocks of up to 7,000 tons and ship them directly from the yard.

Using these efficient production facilities and plenty of skilled manpower, we provide high-quality products.



Erection

Introduction of our cutting-edge technologies in erection

Erection of cables of suspension bridge

Air spinning (AS) construction method

World's top class suspension bridge cable "Aerial erection technology"

The cable erection of a suspension bridge has two methods - namely, the Air Spinning (AS) method and the Pre-fabricated Parallel Wire Strand (PPWS) method.
The Air Spinning Method is a method to erect cables, by spinning small 5 mm dimension wires one by one. We use the low tension control method, in order to ensure quality and workability. Unlike other manufacturers, we have experience in the erection of overseas suspension bridges using the AS method. Through long experience, we have developed and established know-how on the AS method, including quality control, high-speed erection, adaptation to longer span bridges, and improved AS erection machineries which enable 24 hours seamless operation.

Overhanging erections for cable stayed bridges

Balancing erection method

"Floating balance toy"

The usual method for the construction of cable stayed bridges is to erect the girders in the side span at first, and then to erect the center span by the cantilever erection method. However, this method requires an underwater bent for the erection of the side span, and this can have a substantial effect on the environment.
We provide a solution to this problem by the "Balancing Erection Method", where the main girder is erected from a tower, to both sides of the axis direction, by using a "Diagonal Bent". This method does not require an underwater bent. Although this may look like some kind of balancing toy, and you may think it is unstable, actually good stability is secured by applying our advanced position control technologies. This erection method is stable even during an earthquake or typhoon.

Cable erection method

Straight-line cable erection method

Making the erection of arches more efficient by using preload

The cable erection method is extremely challenging and labor-intensive, and typically adopted in constructing arches. Here, the bridge body is suspended by hanger cables from a main cable fixed between pylons, meaning the deflection may constantly changes according to each step of erection, and requiring the length of the hanger cables to be frequently adjusted.
In traditional cases, the left and right sides of the bridge body shall be constructed alternately; but by changing the erection sequence to complete one side first, improved method can shorten the moving distance of the workers and minimize the adjustment work of hanger cables by preload.

Batch setting of large blocks using a heavy-duty carrier

Batch setting of large blocks using a heavy-duty carrier

Making narrow areas passable by changing the motions of large carriers on both sides

This method is adopted in many projects for erecting girders on express way or major roads, located with constrained conditions such as a lack of work space for setting up, insufficient capabilities of large cranes, or limited time for erection (e.g. one-night erection.)
Erection work in such cases requires special techniques to transport girders to the correct erection position, avoiding obstacles that may exist on the left, right, top or bottom.
Normally, heavy-duty carrier on both sides are connected by steel bars to fix their interval.
Now, by using a developed sequence to control each vehicle positions, the vehicle motions can be changed by keeping fixed distance between each carriers.
Consequently, the relative position of the carriers can be independently adjusted for pitch and roll, which has expanded the feasible scope of erection work in the case that the width of the transport pathways are constrained.

Lifting long girders with a single barge

Erection of large blocks using floating cranes

Fitting warped girders

The floating crane method is a major large-block erection method. When a large block, if long or deformed, is lifted, the girder will cause substantial deformation from the initial lifting until the end of erection another deformation may occur from temperature changes. Simulating these deformations or stress states of the girder in advance will help to ensure safe and accurate erection.

Fast launching erection over heavy traffic

Fast launching erection over heavy traffic

Faster and safer erection above heavy traffic

The launching method means erecting bridge girders fabricated beside the point of erection by launching. With this approach, erection above an existing road, which ordinarily required road closure over three nights, can be completed in one night. We have accumulated expertise on safe erection within short periods of time, even for multi-width bridges, curved girders or other complex conditions. This method thus significantly helps to reduce traffic congestion caused by traffic regulation, and to prevent bad impact on distribution systems.

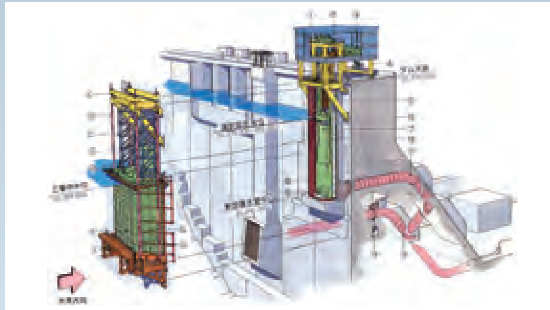
Efficient concrete placing for RCD dams

Pull-in method

Minimizing the suspension period of concrete placing

lThe pull-in method means that no block shall be suspended at the stage of concrete placing by pulling a pre-assembled structure, that consists of discharge pipes or other components fabricated on the stage, into the dam body using placing lifts.
The RCD(Roller Compacted Concrete) method have several advantages in concrete placing.With this method, bulldozers, vibrating rollers and many other machines can be employed and concrete can be placed rapidly in bulk, and it will make the construction faster, cheaper and safer.
The pull-in method can make it possible to cut down the suspension period of concrete placing and to reduce the deterioration of dam body without spoiling any advantages of RCD method, and this will achieve cheaper, faster and safer construction projects with higher quality.

Redevelopment of operational dams



Cofferdam method

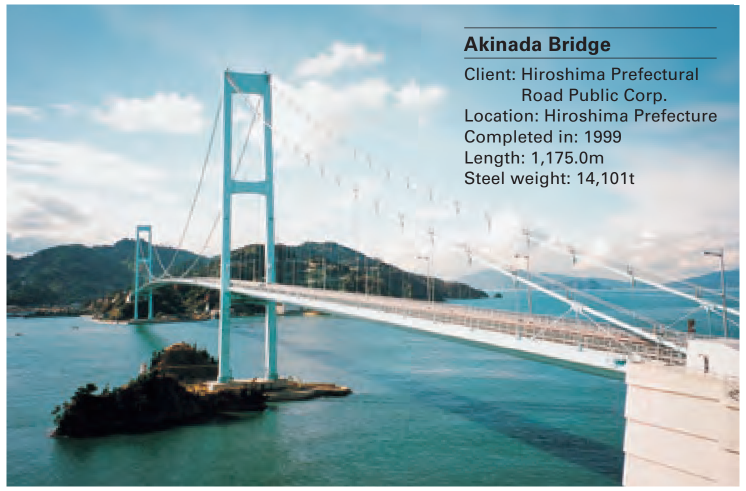
Cofferdam gate enabling dry construction in deep water

In line with changing environmental and social circumstances, the requirements for dams have also changed to include higher intake and discharge capabilities and new functions, such as sand removal. As a result, some existing dams, although already operational, must be redeveloped.
We actively employ the cofferdam method, which makes it possible to replace or upgrade the facility in service, i.e. a reservoir filled with water, without undermining the convenience it provides.
The installation of cofferdam equipment, which identifies the degree of degradation and damage of a decrepit dam while ensuring safety during the works, requires high level techniques and skills as well as experience.

Bridge projects (in Japan)

Akashi-Kaikyo Bridge
Client: Honshu-Shikoku Bridge Authority
Location: Hyogo Prefecture
Completed in: 1997
Length: 3,911.1m
Steel weight: 178,138t

Daini Ondo Bridge
Client: Hiroshima Prefecture
Location: 8 Kegoya, Kure city, Hiroshima Prefecture-1 Tsuboi, Onndo-machi
Completed in: 2011
Length: 292m
Steel weight: 4,764t

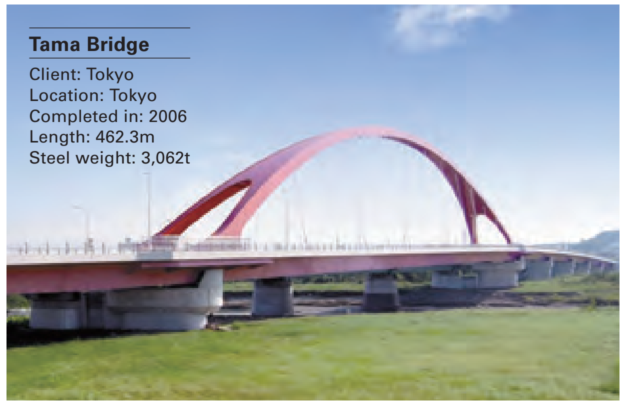


Akinada Bridge
Client: Hiroshima Prefectural Road Public Corp.
Location: Hiroshima Prefecture
Completed in: 1999
Length: 1,175.0m
Steel weight: 14,101t

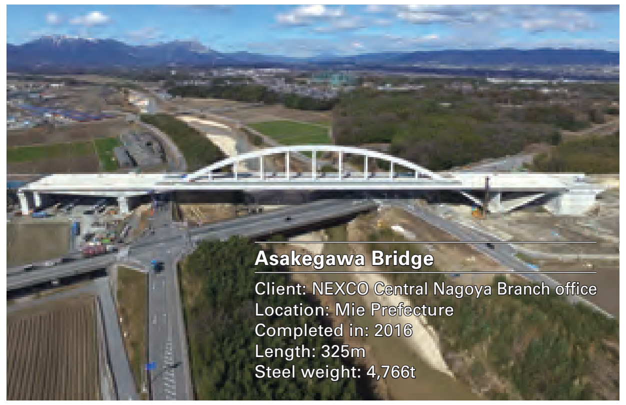
Yuri Bridge
Client: Yurihonjo city, Akita Prefecture
Location: Yurihonjo city, Akita Prefecture
Completed in: 2013
Length: 190.5m
Steel weight: 2,614t

Hakucho Bridge
Client: Hokkaido Regional Development Bureau
Location: Hokkaido
Completed in: 1996
Length: 1,380.0m
Steel weight: 19,766t

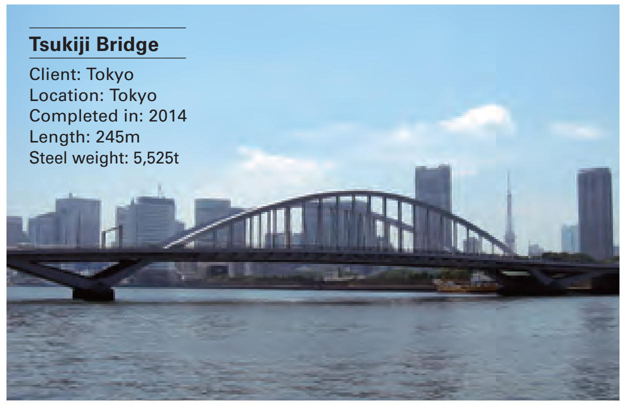
Iwakurojima Bridge (Great Seto Bridge)
Client: Honshu-Shikoku Bridge Authority
Location: Kagawa Prefecture
Completed in: 1986
Length: 720m
Steel weight: 33,258t



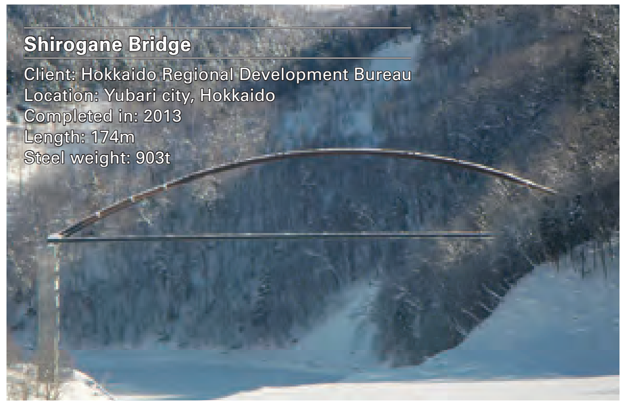
Tama Bridge
Client: Tokyo
Location: Tokyo
Completed in: 2006
Length: 462.3m
Steel weight: 3,062t



Asakegawa Bridge
Client: NEXCO Central Nagoya Branch office
Location: Mie Prefecture
Completed in: 2016
Length: 325m
Steel weight: 4,766t

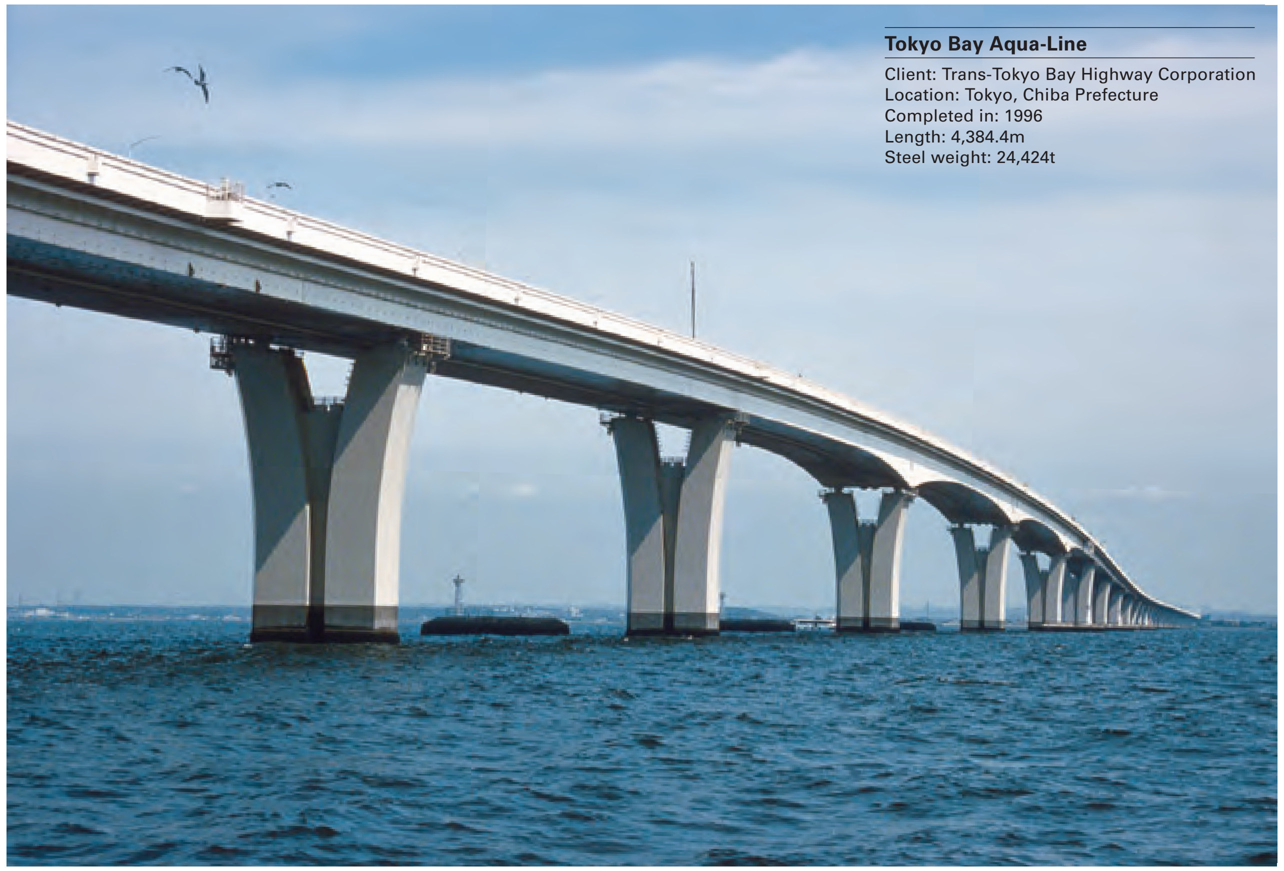


Tsukiji Bridge
Client: Tokyo
Location: Tokyo
Completed in: 2014
Length: 245m
Steel weight: 5,525t



Shirogane Bridge
Client: Hokkaido Regional Development Bureau
Location: Yubari city, Hokkaido
Completed in: 2013
Length: 174m
Steel weight: 903t

Bridge projects (in Japan)



Tokyo Bay Aqua-Line
Client: Trans-Tokyo Bay Highway Corporation
Location: Tokyo, Chiba Prefecture
Completed in: 1996
Length: 4,384.4m
Steel weight: 24,424t

Rakunan Connecting Highway
Client: Kinki Regional Development Bureau
Location: Kyoto Prefecture
Completed in: 2007
Length: 318m
Steel weight: 3,744t

Sekiguchi Bridge
Client: NEXCO Central
Location: Sekiguchi, Atsugi city, Kanagawa Prefecture
Completed in: 2013
Length: 289m, 55m
Steel weight: 3,209t

Hinoki North Elevated Bridge
Hinoki Central Elevated Bridge
Hinoki South Elevated Bridge
Nakasone Elevated Bridge
Client: Chubu Regional Bureau, Ministry of Land, Infrastructure, Transport and Tourism
Location: Hinoki-cho, Ogaki city, Gifu Prefecture
Completed in: 2012
Length: 284m, 143m, 162.5m, 185m, 289m
Steel weight: 2,178t 2,103t 1,483t 1,275t

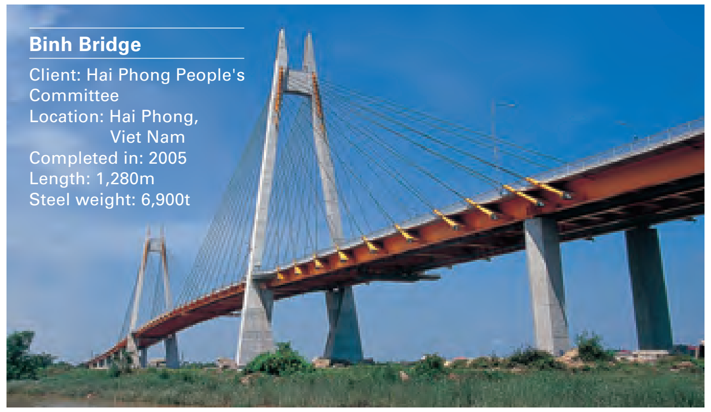
Moto Bridge
Client: Nagano Prefecture
Location: Nagano Prefecture
Completed in: 1998
Length: 212m
Steel weight: 743t

Bridge projects (Overseas)

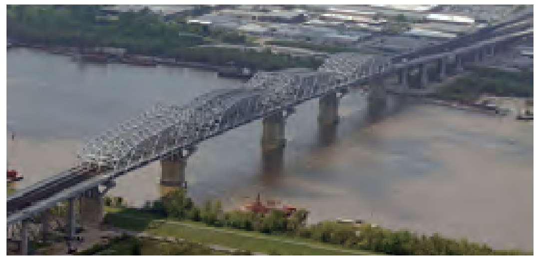
Osman Gazi Bridge (Izmit Bay Crossing Bridge)
Client: Directorate-General of Road Transport Regulation, Ministry of Transport Maritime Affairs and Communications, Republic of Turkey
Location: Gulf of Izmit, Republic of Turkey
Completed in: 2016
Length: 2,682m
Steel weight: 70,490t (main towers, bridge beam, cables)

Nhật Tân Bridge
Client: Ministry of Transport of Vietnam
Location: Hanoi, Vietnam
Completed in: 2014
Length: 1,500m
Steel weight: 14,500t

Second Bosporus Bridge
Client: The Ministry of Transportation of the Republic of Turkey
Location: Istanbul, Turkey
Completed in: 1988
Length: 1,090m
Steel weight: 32,000t



Binh Bridge
Client: Hai Phong People's Committee
Location: Hai Phong, Viet Nam
Completed in: 2005
Length: 1,280m
Steel weight: 6,900t



Huey P Long Bridge Widening
Client: Louisiana Department of Transportation and Development
Location: Louisiana, U.S.A.
Completed in: 2012
Length: 726m
Steel weight: 16,000t

Gate projects (Dam)

We are the leading provider of dams and river gates usable for all purposes, that covers from power generation and flood control to safeguarding lives from natural calamities and harnessing water in the form of warm water intakes and discharges for river maintenance.
We also focus on emerging needs, such as developing new gate types that maintain landscapes, protect the environment, and reduce life-cycle costs. Building on these technologies, IHI Infrastructure plays an important role in developing water utilization and flood control infrastructure in Southeast Asia and elsewhere, thereby contribute to the regional economic development.

Ishikawauchi Dam

Ootaki Dam

Crest Radial Gate

2001 Kinki Regional Bureau, Ootaki Dam:
B10.0m x H14.9m x 4 gates
2006 Kyushu Electric Power Co., Ltd. Ishikawauchi Dam:
B10.0m x H16.0m x 4 gates
2008 Kyushu Electric Power Co., Ltd. Tsukabaru Dam:
B7.0m x H6.6m x 8 gates (renovation work)
2009 Shikoku Electric Power Co., Ltd Tsuga Dam:
B8.5m x H9.1m x 8 gates (renovation work)
And many others

Nagashima Dam

High-pressure radial gate

1995 Japan Water Agency, Hinachi Dam:
B4.2m x H4.5m x 2 gates
1998 Chubu Regional Bureau, Nagashima Dam:
B5.0m x H6.4m x 2 gates
1998 Tohoku Regional Bureau, Tsukiyama Dam:
B4.9m x H4.9m x 2 gates
2003 Chugoku Regional Bureau, Sugesawa Dam:
B3.1m x H2.6m x 1 gate (renovation work)
2009 Kyushu Regional Bureau, Kasegawa Dam:
B3.8m x H3.9m x 2 gates
And many others

High-pressure roller gate

1964 Kinki Regional Bureau, Amagase Dam:
B3.6m x H4.7m x 3 gates (partly renovated in 2006)
1991 Chugoku Regional Bureau, Hattabara Dam:
B3.2m x H3.6m x 2 gates
1999 Chugoku Regional Bureau, Nukui Dam:
B4.9m x H3.9m x 4 gates
2003 Chugoku Regional Bureau, Haizuka Dam:
B3.4m x H3.4m x 2 gates
2010 Kyushu Electric Power Co., Ltd. Hitotsuse Dam:
B1.6m x H2.3m x 1 gate (renovation work)
And many others

Hitotsuse Dam

Haizuka Dam

Other spillways

1991 Kyushu Regional Bureau, Ryumon Dam, High-pressure slide gate:
B1.7m x H2.2m x 2 gates (flood spillway)
1995 Kanto Regional Bureau, Miyagase Dam, High-pressure slide gate:
B2.0m x H2.2m x 2 gates (flood spillway)
1998 Hokuriku Regional Bureau, Unazuki Dam, High-pressure slide gate:
B5.0m x H6.2m x 2 gates (flushing spillway)
2006 Chugoku Regional Bureau, Haizuka Dam, Tensile radial gate:
B2.2m x H2.1m x 2 gates
(spillway for releasing water for environmental use)
2013 Tohoku Regional Bureau, Ministry of Land, Infrastructure, Transport and Tourism Isawa Dam, Jet-flow gate: ø2.4m x 1 gate
And many others

Futase Dam

Selective water intake

2006 Japan Water Agency, Takizawa Dam, Intake volume: 40m^3/s (linear multi-gate)
2006 Japan Water Agency, Tokuyama Dam, Intake volume: 100m^3/s (linear multi-stage gate)
2008 Tohoku Regional Bureau, Nagai Dam, Intake volume: 20m^3/s (circular multi-stage gate)
2010 Chubu Regional Bureau, Ministry of Land, Infrastructure, Transport and TourismYokoyama Dam, Intake volume: 64.5m^3/s
(semi-circular multi-stage gate, renovaton work)
2012 Kanto Regional Bureau, Yunishigawa Dam, Intake volume: 30m^3/s (siphon type)
2016 Kanto Regional Bureau, Futase Dam, Intake volume: 7.5m^3/s
(Multi-stage float membrane gate)
And many others

Gate projects (River)

Gates are constructed at rivers to regulate water flow and prevent the backflow of seawater.
The gates are usually closed to store water, which is then used for water supply and sewerage systems as well as in agriculture, industries, power generation and so on.
In case of flooding, the gates shall be opened to let the water flow down.

Ohkouzu Kadou Weir

Naruka Great Weir

Weir

1995 Kinki Regional Bureau, Kinokawa Great Weir: B40.0m x H7.1m x 1 gate
1996 Kinki Regional Bureau, Naruka Great Weir: B43.4m x H5.7m x 4 gates and others
2008 Chugoku Regional Bureau Kobe Weir: B39.0m x H3.1m x 4 gates
2012 Hokuriku Regional Bureau, Ohkouzu Kadou Weir: B37.95m x H6.75m x 2 gates and others
2012 Hokuriku Regional Bureaulshikari River head work: B42.0m x H4.62m x 2 gates and others
2013 Hyogo Prefecture, Rokkai Weir: B21.03m x H3.42m x 2 gates

Oodangawa Gate

Plate girder type roller gate

1992 Tohoku Regional Bureau, Oodangawa Gate: B20.3m x H12.7m x 2 gates
1998 Kanto Regional Bureau,Tamazukuri Gate: B23.5m x H11.4m x 2 gates
1998 Tohoku Regional Bureau, Oshiwake Gate: B23.8m x H8.8m x 2 gates
2002 Tokushima Prefecture, Tatara Gate: B19.4m x H3.8m x 1 gate
And many others

Kizukawa Gate

Hyaken River Gate

Rising sector gate

1998 Hokkaido Development Bureau, Nagayama Intake Gate: B10.0m x H2.0m x 1 gate
1999 Aichi Prefecture, Hirokuchiike South Gate: B15.0m x H3.9m x 1 gate
2000 Aichi Prefecture, Nikkougawa No.4 Channel Gate: B22.0m x H3.9m x 2 gates
2002 Chubu Regional Bureau, Sumiyoshi gate: B12.5m x H9.1m x 1 gate
2003 Tohoku Regional Bureau, Ohtanichi Gate: B14.0m x H2.5m x 1 gate
2005 Hyogo Prefecture Ohtanigawa Gate: B11.0m x H3.8m x 1 gate
2007 Kyushu Regional Bureau, Kurumefunadoshi Upstream Lock: B10.0m x H2.8m x 1 gate
2011 Chugoku Regional Bureau, Hyakengawa gate: B33.4m x H6.9m x 3 gates

Tsunami countermeasure, tide prevention gate

1970 Osaka, Kizukawa Gate (visor gate): B57.0m x H11.9m x 1 gate
1992 Kinki Regional Bureau, Yodogawa Shore Lock: B24.0m x H3.0m x 1 gate (vertical swing gate)
2001 Osaka, Higashiyokoborigawa Gate: B22.0m x H6.1m x 1 gate (Submergible Radial Gate)
2013 Shizuoka Prefecture, Katsumata River gate: B24.5m x H5.03 x 1 gate (shell structure cernit gate)
And many others

Penstock & Aqueducts projects

The bifurcated penstock with 800 MPa high-strength steel, which can accommodate larger electric power facilities, is our proven technique. The company has also developed a bifurcated penstock with 1,000 MPa high-strength steel, applicable for actual projects. As for aqueducts, which serve as raw water conveyors, various bridge types can be applied.

Dainin hydraulic power plant

Pressure iron pipe

2004 Shikoku Electric Power Co., Ltd. Matsuo (gawa) No1 Power Plant: ø0.7-2.1m Design hydraulic head of 448 m (renovation work)
2006 Vietnam, Dainin hydraulic power plant: ø1.9-3.3m Design hydraulic head of 770m
2008 Kenya, Sondu Miriu Hydro Power Plant: ø1.7-3m Design hydraulic head of 291m
And many others

Okumino Power plant

Branch Pipe

1999 Chubu Electric Power Co., Ltd. Okumino Power plant: ø3.9m Design hydraulic head of 770m.
2006 Vietnam, Dainin hydraulic power plant: ø3.2m Design hydraulic head of 755m
2006 Kenya, Sondu Miriu Hydro Power Plant: ø3.2m Design hydraulic head of 290m
And many others

2007 Aichi Prefecture, Toyokawa Aqueduct Bridge (inverse trigonometric stiffening truss type)
(Pipe diameter: 2,000 mm, Span: 73.6 m)

1995 Fukushima Prefecture, Niida Aqueduct Bridge
(cable-stayed bridge type)
(Pipe diameter: 500A x 2 rows, Span: 1198 x 2m)

1967 Tokyo, Ooi No2 Aqueduct Bridge (Langer stiffening type)
(Pipe diameter: 1022A x 2 rows, Span: 79.8 x 2 m)

2008 Kagoshima Prefecture, Komenotsu Aqueduct Bridge
(Basket-handle-shaped, Nielsen system Lohse type)
(Pipe diameter: 300A, Span: 59.38 x 2m)

Seismic isolatation and vibration control projects

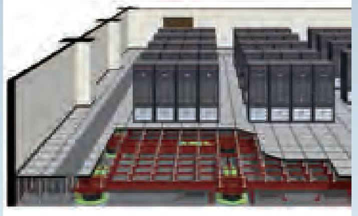
Vibration control devices

Vibration control devices are installed on top of high-rise buildings or control towers at airports to dampen vibrations caused by strong winds and tremors when earthquakes strike. Our equipment is deployed at domestic and international.

Vibration control device for offshore crane suspension frames

A vibration control device equipped on the suspension frames of offshore cranes. Reduces the shaking of offshore cranes caused by strong winds and waves and helps to improve the safety of hoisting loads.

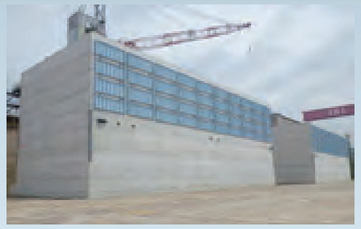
Seismically isolated floors



Seismically isolated floor will fulfill its function in both horizontal and vertical directions against earthquakes and minimize the damages.
Once internally installed, the system will protect computers or other essential equipments from earthquakes.

Marine structures

Hybrid caisson



Hybrid caissons are characterized by the hybrid structure using steel plates and concrete, and are high-strength and can be applied to complex shapes. They are used in breakwaters, quays, seawalls,etc.

Floating pier

Regardless of the water depth, the distance between the water surface and the crown remains constant.
Therefore, there will be no height gap between ships and the quay. Also, since the pier is moored with posts, it sways very little.

Immersed tunnel

These are one element (box) in constructing submarine tunnels that are divided into sizes that will not impair towing and sinking. There are different types, such as hybrid steel and concrete caissons, steel-reinforced caissons, etc. (The photograph shows a steel and concrete caisson.)

Floating breakwater

These are placed offshore to reduce or break waves. A design that is backed by maritime structural technology provides stable performance. These breakwaters provide an economical and easy-to-construct breakwater for deep water and weak seabed areas.
These are environmentally friendly structures that do not disturb the sea currents.

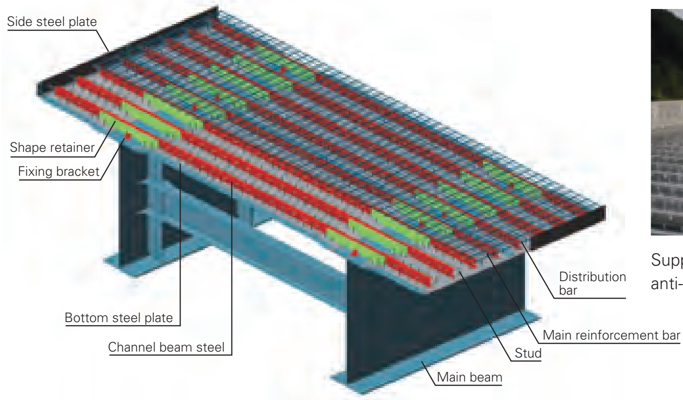
Skew plate breakwater

This is a deep-water, footed, detached breakwater that was developed with the Public Works Research Institute to prevent coastal erosion and for multipurpose utilization of coastal areas.

Channel beam composite slabs

These composite slabs are used on bridges and tunnels and are formed by using channel beam steel to reinforce the bottom steel plate. Easy to install with superior durability, the need for scaffolding can be eliminated by using IS clips and IW nuts.

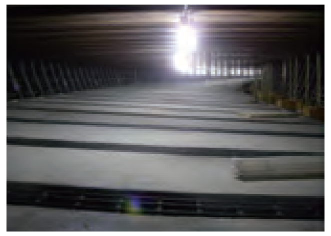
Outline of a channel beam composite slab



Composite slabs for bridges

Supporting all types of bridges and anti-corrosion specficiations.

Tunnel slabs (precast)

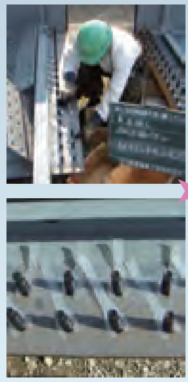


Can be applied to tunnel slabs.
Also supports precast slabs as well as concrete prepared on-site.

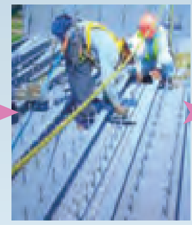
IS clips

By using IS clips in composite slab joints, it is possible to work from the top of the bridge without using scaffolding. Insert bolts into the composite slabs prior to installation on-site and secure using IS clips. Support plated bolts and non-plated durable type bolts.

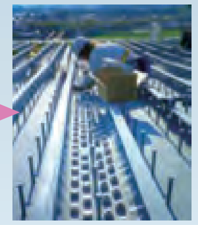
IS clip installation procedures



IS clip installation



Splice plate intallation

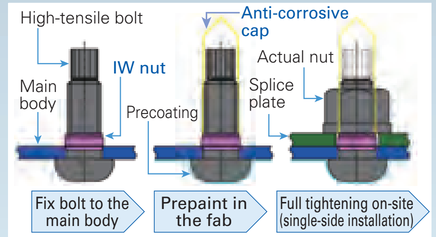


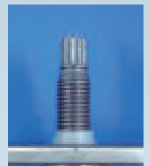
Temporary fastening with nuts

IW nuts

By using IW nuts in composite slab joints, it is possible to work from the top of the bridge without using scaffolding. When constructing plants, by installing bolts with IW nuts and coating the joints as well, on-site coating is not necessary. Supports coated bolts.

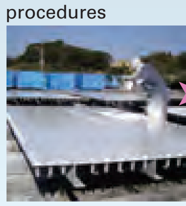
IW nut outline





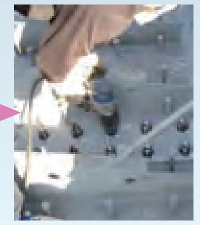
Installed IW nut

IW nut installation procedures



Install bolt and paint in the fab

Install splice plate on-site



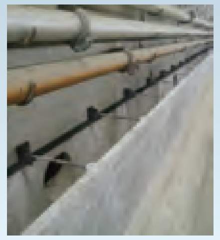
Temporary and full tightening of actual nut.

DEW panels

Precast concrete used for bridge guard walls and tunnel protection concrete.
Easily installed with high quality due to plant fabrication.

Guard wall type (outer face)

Guard wall type (inner face)



For tunnel protection concrete

Bridge maintenance

We are urged by society to effectively utilize existing social capital stock and extend its lifetime. Our challenges include not only repairing bridges deteriorated and damaged over years to restore their original state, but also reinforcing and remodeling them to improve their performance for increasing traffic volumes, seismic proof and other future demands.

Seismic reinforcement work

Seismic reinforcement work on Arakawa Wangan Bridge
Remodeled the intermediate support point area of the Arakawa Wangan Bridge (7 span Cantilever truss, total span: 840m) to secure resistance from Level 2 earthquakes (of the offshore Southern Hyogo Prefecture earthquake class)

Client: Metropolitan Expressway Company Limited

Improved earthquake resistance of bearings and couplers
Replaced bearings with a reaction force of 10,000 KN, and installed a bridge collapse prevention device to improve the earthquake resistance of the bridge.

Before (Pivot roller bearings) → **After** (Rubber bearings)

Client: Metropolitan Expressway Company Limited

Seismic reinforcement work overseas
IHI Infrastructure carried out large-scale bridge seismic reinforcement projects in Istanbul, Turkey. To provide for the future massive earthquakes, we have completed the seismic strengthening project that consists of four sections, including the first and second Bosporus bridges.

Client: Ministry of Public Works, Republic of Turkey

Reinforcement of corners and supporting points of steel bridges

Reinforced the corners and supporting points of a steel bridge over 40 years old located on the Metropolitan Expressway, in order to maintain safety and driving comfort.

Client: Metropolitan Expressway Company Limited

Widening

Widening work is carried out in order to mitigate chronic congestion on expressways. Projects in city centers require considerably challenging design, fabrication and implementation techniques, as they involve the renovation of structures within limited space while ensuring continuous traffic flow.

Client: Nagoya Expressway

Sound-absorbing panels

Sound-absorbing panels for the underside of elevated bridges

Sound-absorbing panels for the underside of elevated structures, developed with the aim of absorbing reflected sound from the underside of bridges, have a sound-absorbing performance which exceed the requirements of the Ministry of Land, Infrastructure, Transport and Tourism.

Sound-absorbing louvres for underside application

Sound-absorbing panels for underside application

"Shizumaru-kun" – an enclosure with a silencing function

The sound of generators on construction sites significantly effects the surrounding environment. To solve this problem, we have developed "Shizumaru-kun", an enclosure with a silencing function, comprised from panel enclosures for generators installed with a silencing system. Drawbacks of the conventional enclosure were that it was difficult to prevent noise leakage due to exhaust at a single ventilation port and that the temperature rose easily due to easily filling with exhaust gas. In addition to separating the ventilation port, by installing "Shizumaru-kun" which has a "noise preventional gallary" at its intake and a "splitter silencer" at its exhaust port, noise generation was signifcantly suppressed without the internal temperature rising.

Shizumaru-kun

TRIAS

TRIAS is a generalized assembly bridge which can be constructed rapidly and economically.
It can be installed so quickly and easily in any kind of field that it functions as an emergency bridge and transports heavy vehicles immediately.
There are two types of TRIAS: the I-shaped girder type and the truss type, and both of them can be used for various purposes, such as post-disaster recovery or access road for construction.

Hakucho Bridge

Hyuga Ohashi Landing Bridge
Location: Miyazaki Prefecture
Length: 24mx10, 22mx5, 24mx2
Width: 8m
Type: Deck Truss, Through Truss
Load capacity: Live Load B

Erection support

Erection truss for Kuki Bridge
Location: Yamanashi Prefecture
Length: 68m(34m x 2)
Type: Deck truss support
Load capacity: Concrete bridge support work

Post-disaster recovery

Nichinan TRIAS for post-disaster recovery
Location: Miyazaki Prefecture
Length: 40m
Width: 4m
Type: Through TRIAS
Load capacity: 200-t crawler crane

Post-disaster recovery

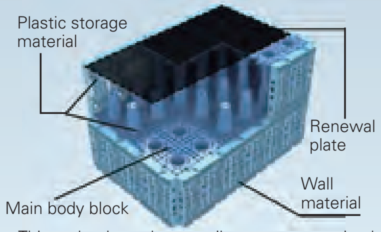
Ohtoumura TRIAS for post-disaster recovery
Location: Nara Prefecture
Length: 60m (20m x 3 structures)
Width: 6m
Type: I-shaped Girder TRIAS Type II
Load capacity: Live Load B

Research and development

Disaster prevention

Rainwater storage and infiltration tank “GEOCUBE” method

For suppressing rainwater outflow and rainwater utilization Development of plastic underground installation storage material



Downpours exceeding 100 mm per hour in both major metropolitan and regional areas are becoming a social issue. This product is installed underground to store rainwater quickly and allow it to slowly infiltrate the ground.
This technology also contributes to water circulation as a facility allowing stored rainwater to be used effectively.
This water tank forms a water storage space with over a 95% porosity and, due to the fact it is installed undergroud, the area above it can be used effectively.
This product satisfies all of the technological evaluation items required by the Association for Rainwater Storage and Infiltration Technology.

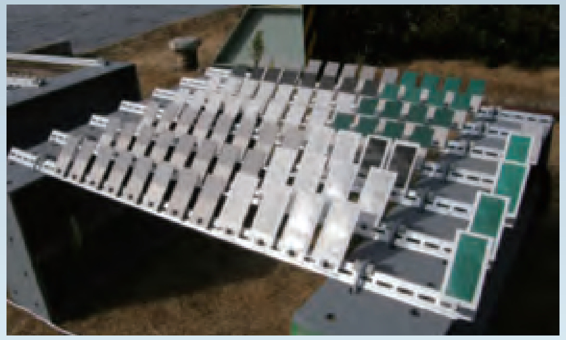
Seismic resistance technologies

Seismic resistance performance analysis

For the safety of structures in case of a large-scale earthquake

Japan experiences frequent earthquakes, exemplified by the damage caused by the Great Hanshin Earthquake and Great East Japan Earthquake of recent years.
There is a high probability that a large scale earthquake will strike in the near future involving multiple plates in the Tokai, Tonankai and Nankai regions, creating concern that civil engineering structures will be damaged.
As well as ensuring that bridges and other civil engineering structure are not damaged when an earthquake strikes, it is necessary to maintain the health of such items to secure lifelines.
IHI Infrastructure Systems is engaged in ongoing efforts to secure the seismic resistance of such structures.

Development of anti-corrosion technologies

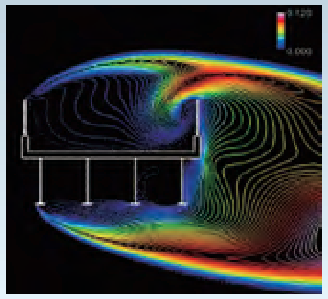


The prevention of corrosion-related degredation of bridges and gates is effective in the improvement of such structures' durability and reduction of LCC (lifecycle cost).
IHI Infrastructure Systems conducts corrosion tests using various anti-corrosion methods and carries out R&D activities to improve anti-corrosion technology.

Wind-resisting technology

Wind resistance evaluation

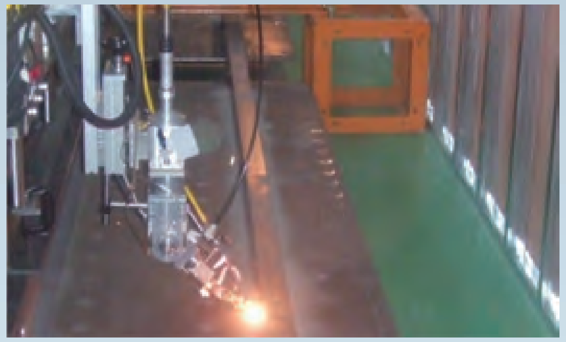
When constructing long span bridges, we study the wind in order to avoid the distortion and vibration that this causes. We analyzes bridges' wind resistance capability through wind tunnel testing and response analysis, and with numeric data derived from such tests, we provides the most optimum solution to design issues.



Welding technologies

Laser welding

Application of the laser welding method to steel structures



We are carrying out research for the application of laser beam welding in the manufacturing of bridge parts, in light of its advantages of high accuracy, high speed and minimal warping due to low heat input.
We have confirmed performance of this in joint tests, etc., and have partially trialed on actual structures.

Welding technology under vibration

As a part of the repairs and reinforcement of social infrastructure predicted to become even more necessary in the future, we have used an actuator to reproduce the vibration assumed to occur during repair work on concrete slabs under real road conditions, in order to investigate welding material and conditions where defects would not easily occur.

Wind-resisting technology

Wind resistance evaluation

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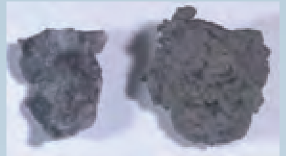
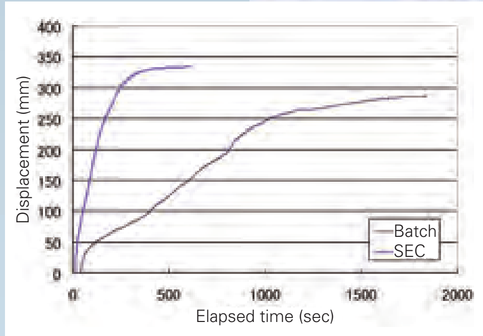
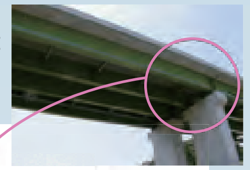
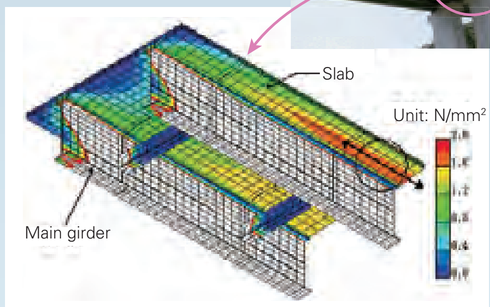




Temperature-stress analysis

Countermeasures against the cracking of concrete structures





In a construction project involving a concrete structure, cracking sometimes occurs due to temperature stress, dry shrinkage and other actions associated with internal heat generated after concrete casting. To solve this issue, we are engaged in developing technologies to accurately simulate temperature and strain behaviors during construction by using FEM temperature-stress analyzer. For bridges, we have employed this method as a countermeasure against cracking in concrete structures, including slabs, girders, abutments, curbs and guard walls.

Load testing equipment

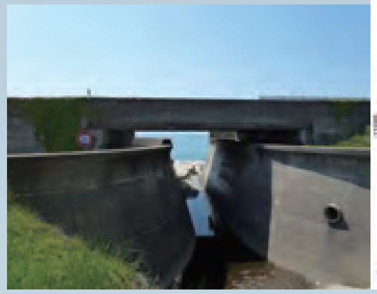
Tests related to concrete

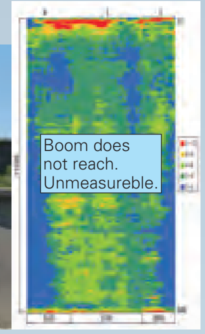
Various tests relevant to concrete are performed with the use of the following test equipment:
- **2,000-, 1,000- and 500-kN fatigue testers**
- **Wheel load fatigue testing equipment**
- **Load testing equipment**
  (large vibration tables, walls, reaction force floors, etc.)
- **Material testing facilities**
  (universal testing machines, freeze-thaw testers, fast salt permeation test equipment, etc.)

Diagnostic technologies

Non-destructive, non-degrading diagnosis system

“Concrete View”

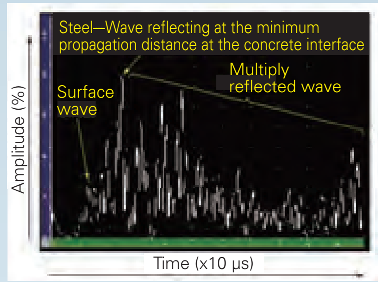


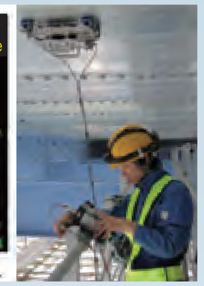


Concrete View uses spectrometry to make the concentration of chloride ions on the surface of concrete visible. Concrete View is anticipated to improve the efficiency of maintenance because it can predict areas which will deteriorate due to salt erosion, therefore can be used for position screening in detailed investigations, estimating repair area and used for incoming salt simulation.

Utrasonic technology

Assessment technology for the health of slabs using an ultrasonic method





The ultrasonic method makes it possible to detect gaps, etc., in composite structures such as composite slabs, unable to be detected with the naked eye. By applying this technology, it will be possible to detect defects in the concrete filling of newly constructed structures as well as filling insufficiencies, peeling, etc., in existing structures.

Development of technology to measure penetration amount of concrete slab U-rib welding

Specifications for highway bridges require a penetration rate of 75% of the U-rib thickness for deck plates and U-rib longitudinal welding. IHI Infrastructure Systems has established an original method of measuring the penetration amount of U-rib welding.

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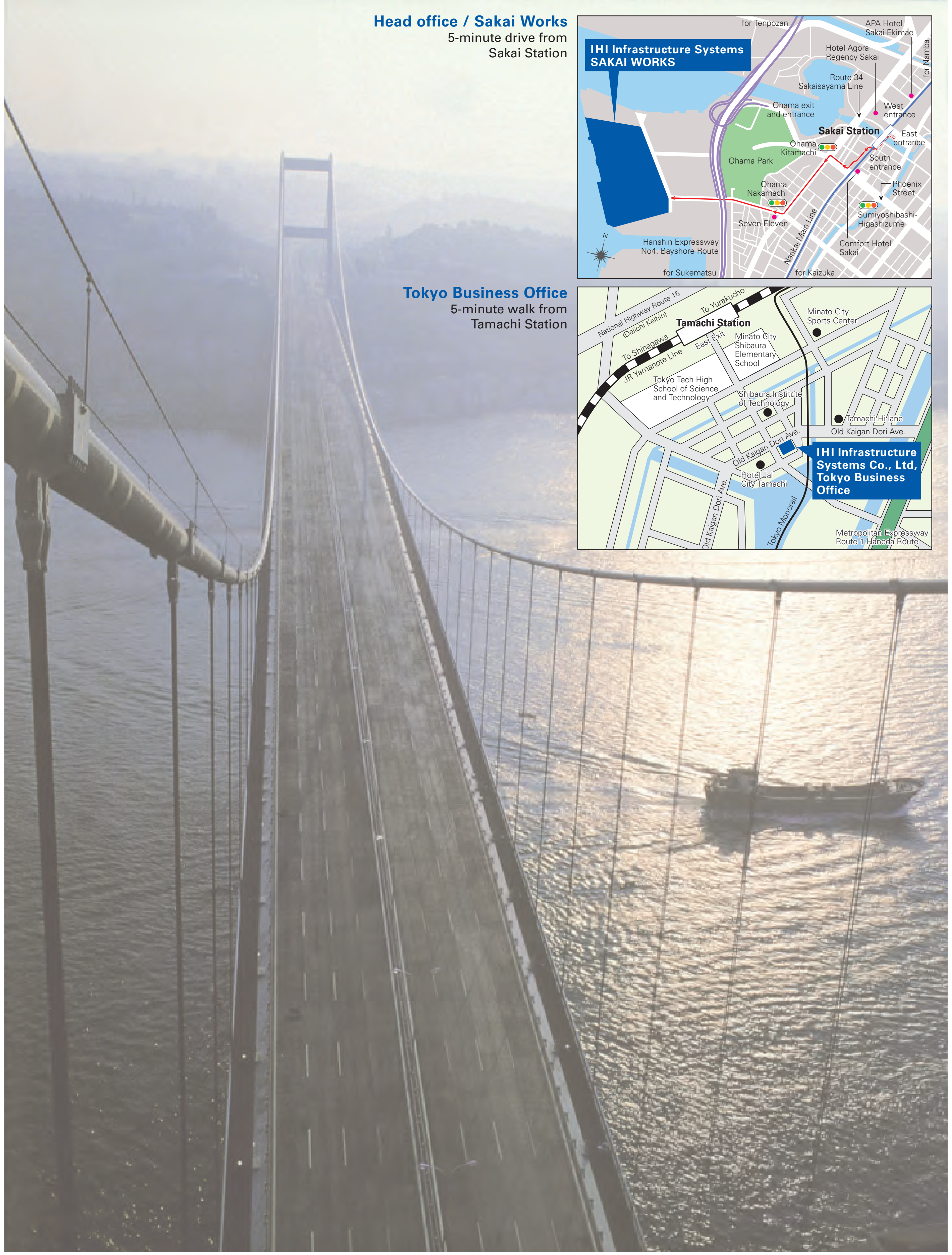

Second Bosporus Bridge (Picture of back cover: Bersia Dam)

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