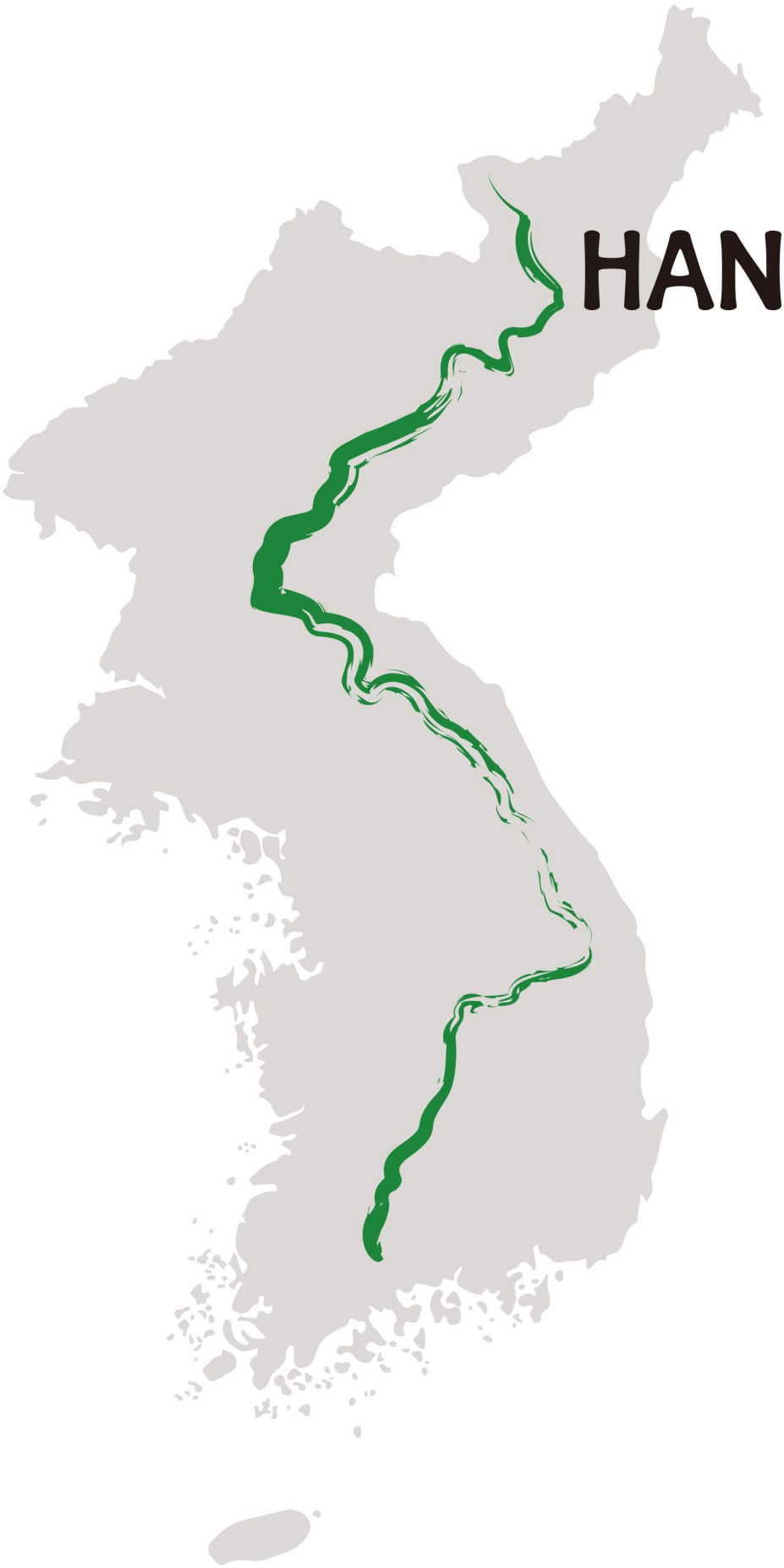


HANMAC

HANMAC FAMILY

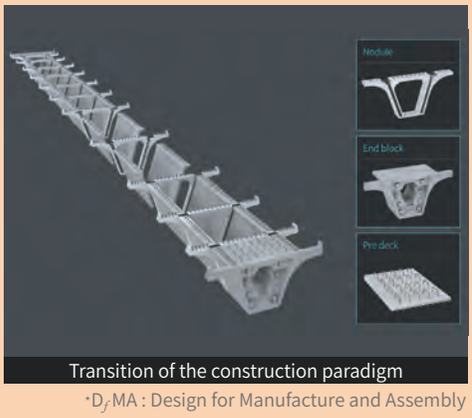
- Ideology
- Our technology
- History
- Company
  - SAMAN
  - HANMAC
  - HALLA
  - JANGHEON
  - PTC

Under the philosophy of “With Technology, let’s make human and nature come together”, HANMAC Family Companies are doing their best to realize a reliable specialized environmental and construction engineering technologies

In the construction and environmental engineering sector, our mission is to provide the solutions that will transform the industry. To accomplish this mission, we are developing innovative engineering software and fabrication technologies that will realize manufacturable construction.

for Innovation

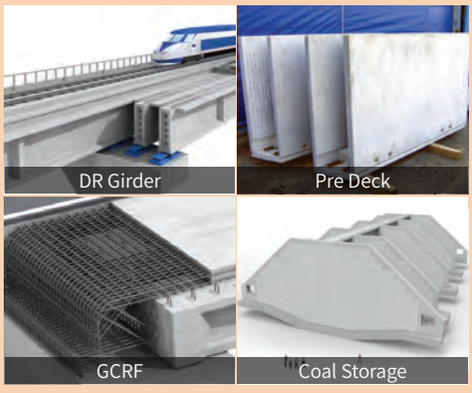
Engineering Project Using Intelligent S/W / Manufacturable Construction Optimized by D_fMA



Transition of the construction paradigm

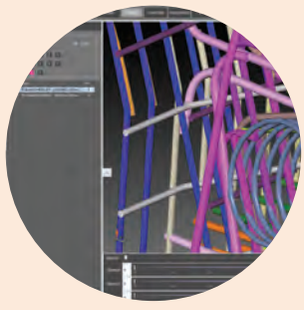
*D_fMA : Design for Manufacture and Assembly

Transition of the construction paradigm to component manufacturing and on-site assembly



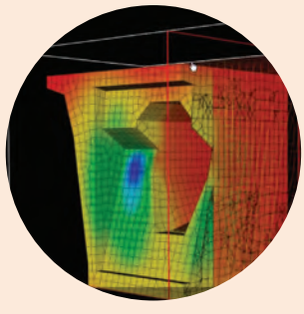
Development of Precast Fabrication Methods for Productivity Innovation

Total Solution Provider covering Design and Construction



Intelligent Engineering Projects faithful to the Essence of Engineering Technology

Entering into the global market with outstanding Engineering Software



Distinguished Consulting Services with cutting-edge Engineering Software

Center of Hanmac's commitment to Innovation

Technology Development Center

Pioneering the future construction industry

The Technology Development Center is a joint organization of engineers from all Hanmac family companies.
The center is committing to innovate new construction technologies by combining information and communication technology with civil engineering technologies.

Its primary mission is to improve the productivity from the stagnant status of the productivity of the construction industry.

To accomplish it, the center devises new design and fabrication technologies.
Also, it develops intelligent software by utilizing ICT to enhance the existing design and engineering methods.

We have been trying to show the new direction of construction industry by developing design technologies to optimize efficiency of manufacturing, assembling and Installation, and building up the software system to feed back of drawbacks of the developed design technologies through applying the developed engineering software to construction site.

Based on the knowledge and experience collected from its expert engineers and software developers for years, the center explores the new direction to where the future construction industry should proceed.

Innovation Keywords

1 Digital

GSIM, combining GIS with BIM,
for infrastructure facilities

BIM

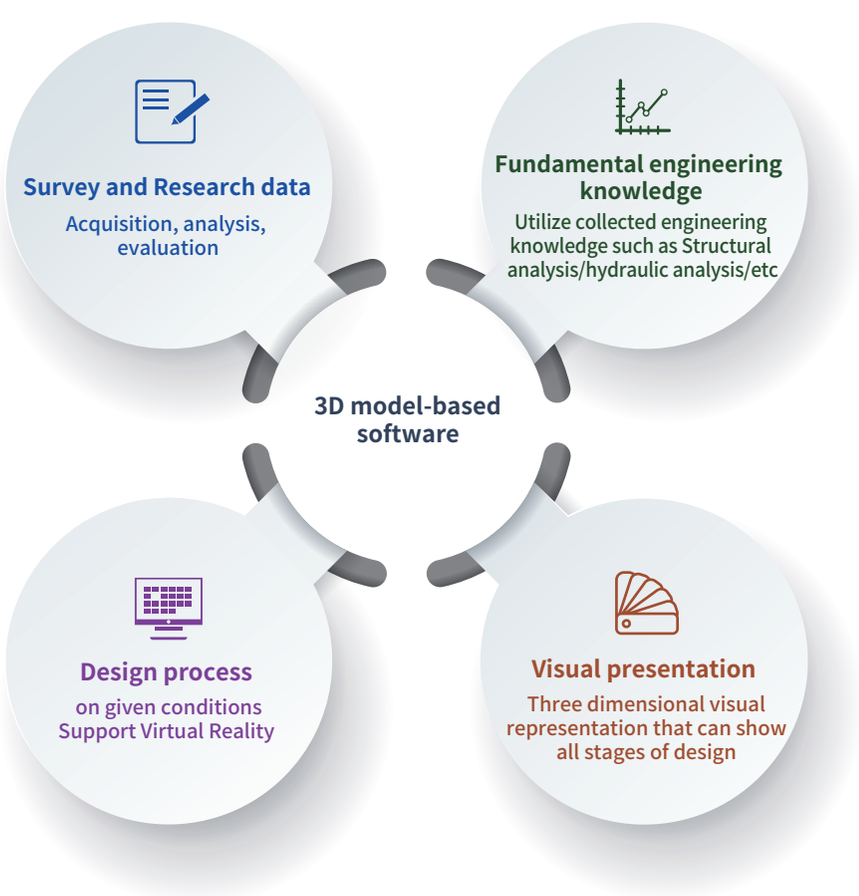
GSIM | Convergence technology

ENG. S/W | Design | ICT technology

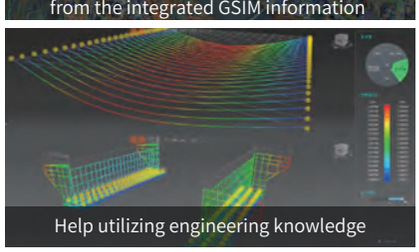
The nature of Engineering S/W for Infrastructure

1 Developing Engineering Software for BIM

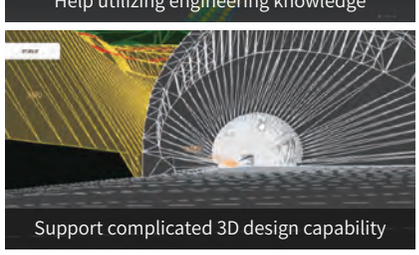
- By focusing on the essence of the technology, deliver easy-to-understand outputs and increase value of public facilities
- Realize digital transformation with new construction technologies that integrates design and construction



Generate basic reports
from the integrated GSIM information



Help utilizing engineering knowledge



Support complicated 3D design capability

Perform Intuitive infrastructure simulation

DfMA

Precast

Construction technology integration

Engineering

KATERRA

Future construction business

2 Mobile

Transforming construction with prefabrication technologies

· DfMA : Design for Manufacture & Assembly

Design for Manufacture & Assembly

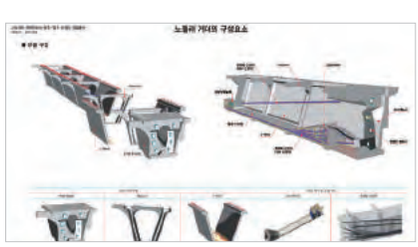
2 Transition of the nature of construction using Precast Method

- Efforts for better productivity and ICT adaptation accelerates the shift to smart construction
- Beyond BIM-based design and construction, smart construction will transform the essence of the construction industry

Changing only document formats, without transition of the design process

Separate BIM technologies for design, construction and maintenance

- ✓ 3D model-based design
- ✓ Automatically generates contract drawings
- ✓ Quantity take-offs
- ✓ Clash detection between components
- ✓ Support for decision making



Integrating design and construction processes

Integrating design, construction, management technologies

- Construction simulations for decision making
- Smart construction using 3D BIM data

Future construction industry

Building new construction industry in novel form

- Future construction industry will have previously unseen form
- Change is inevitable due to internal and external momenta around the industry

Directions to Innovation

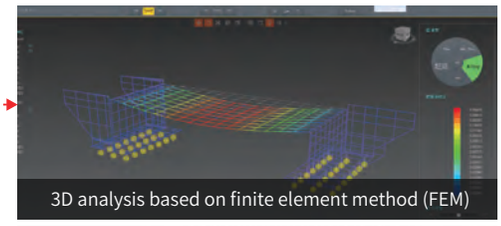
1 Smart construction with ICT convergence

Make professional knowledge comprehensible to everyone

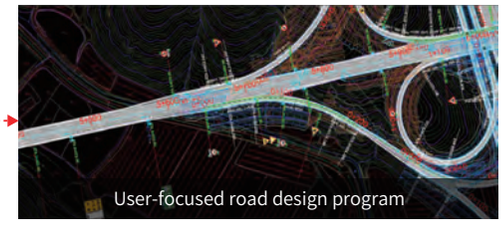
Making distinguished engineering software to respond to the changes initiated by BIM adoption

- Building and collecting BIM models from all stages of infrastructure lifecycle
- Utilizing VR and AR for better comprehension and communication of the proposed design
- User centered deliverables based on the essence of the construction technology, with the help from ICT

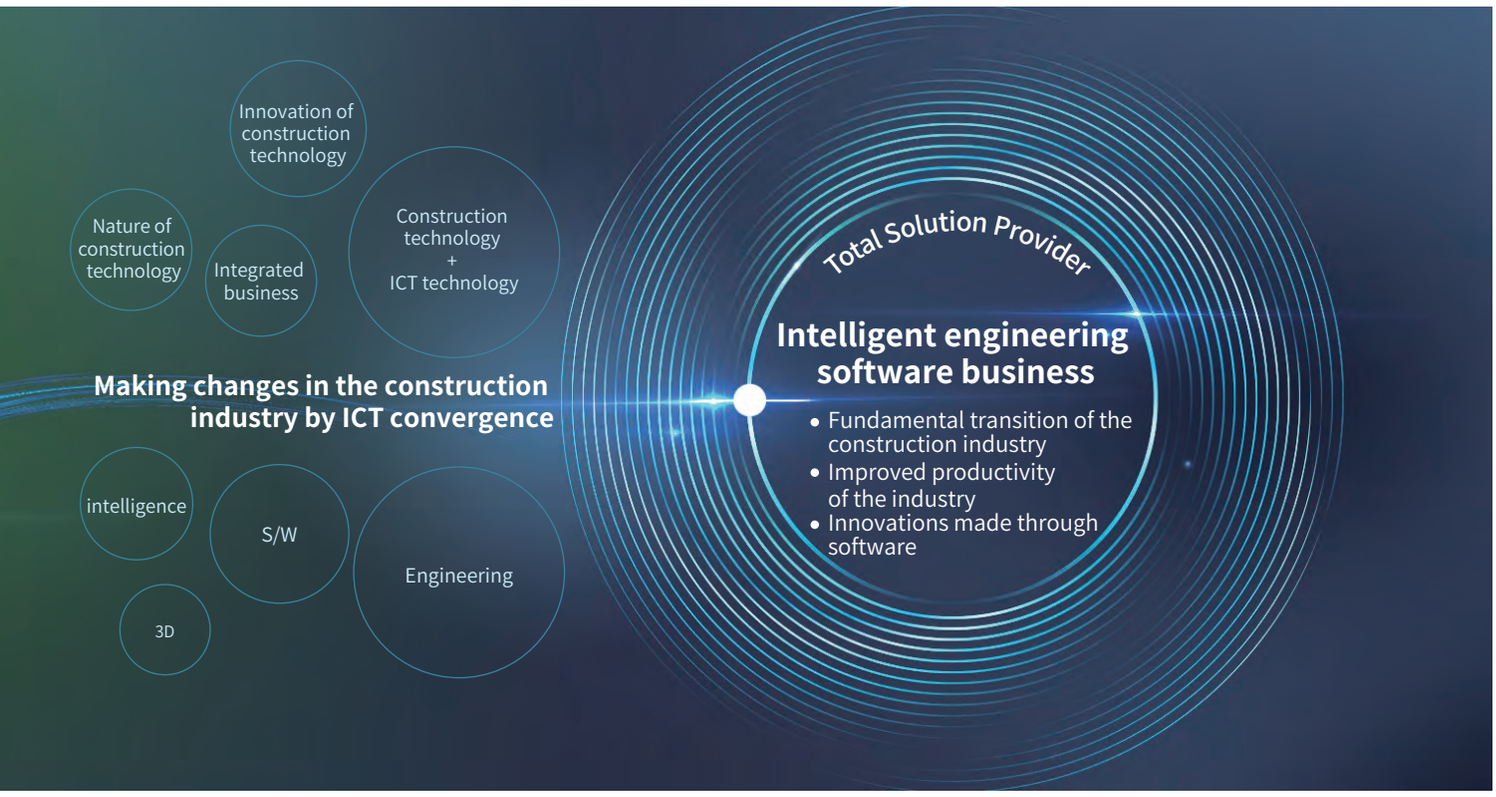

3D Information ▶ GSIM Information


3D analysis based on finite element method (FEM)


One-Stop tunnel design program


User-focused road design program

- Develop software that is capable of accumulating construction technology
- Develop software that is capable of turning construction technology to intelligence
- Develop convenient software that can optimize design capacity

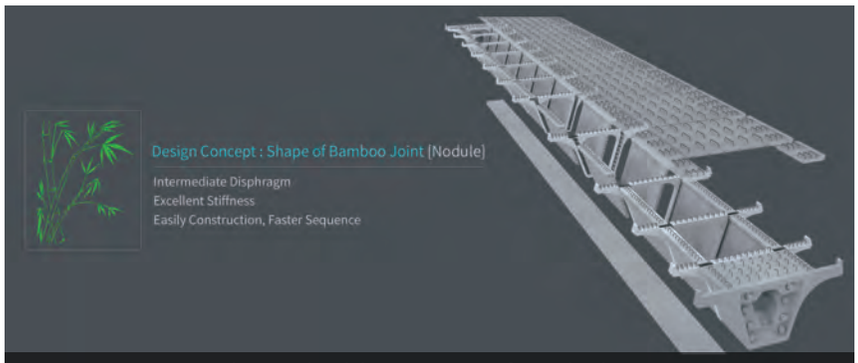


2 Developing fabrication system that transforms the construction industry

Create construction techniques and equipment based on optimized engineering capabilities with smaller precast components

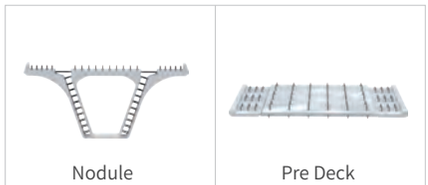
Draw an implementation plan that will improve the productivity of the industry, which has been stagnant for decades.

- Optimized design that considers various needs from each stages in project from design to assembly.
- Minimizing dangerous in-situ works and countering labor shortage
- Modularize components to promote the paradigm shift of the construction industry, making construction more stable and efficient



Implemented nodular-gutter using DfMA technology


Implemented coal storage using PSC block precast method


Nodule

Pre Deck


J-Web


End Block

Implemented nodular-gutter's precast parts

BIM program & equipment to accelerate production efficiency

• At the Technology Development Center…

Select key technology that can distinguish us in the field of business

⬇

Pursuit the nature of construction technology / engineering software

⬇

Maximize construction industry's production rate using DfMA

History of HANMAC Family

SAMAN/ PTC/ HANMAC/ HALLA/ JANGHEON

About us

The HANMAC family consists of 5 companies such as SAMAN Corporation and HANMAC ENGINEERING Co.,Ltd- an engineering consultants, JANGHEON ENGINEERING & CONSTRUCTION – a company specializing in bridge and civil engineering construction , PTC - a company specializing in geotechnical engineering & pile, and HALLA Energy & Environment - EPC and Operation company for environmental facilities.

2005

JANGHEON
ENGINEERING & CONSTRUCTION

Construction and new technology development for bridge and other structures of civil engineering

1999

HALLA
Energy & Environment

EPC and Operation for the Environmental Facilities in domestic and overseas (waste treatment, air pollution prevention, waster water treatment, etc.)

1996

HANMAC
ENGINEERING

Planning, Design, Construction Management and innovative engineering technology development for infrastructure and environmental project

HANMAC Head Office Roof Garden

- **1996. 05** : Founded HANMAC ENGINEERING Co.,Ltd.
- **2005. 03** : Founded JANGHEON ENGINEERING & CONSTRUCTION as a foundation of Total Solution Provider
- **2005. 09** : M&A of PTC for enhancing synergy effects for Bridge Construction between three companies (HANMAC ENGINEERING Co.,Ltd, JANGHEON ENGINEERING & CONSTRUCTION and PTC)
- **2014. 12** : M&A of HALLA for shaping better aspect of total solution provider for prospective future Environmental Business (Engineering, Construction and Operation)
- **2015. 12** : M&A of SAMAN Corp. for widening engineering business field & active expanding overseas markets

1994

PTC
Precast & Pile Tech Corp.

Bridge Construction using Hybrid Composite Piles(HPC) and other precast concrete components

1967

saman
Saman Corp.

A multi-disciplinary engineering company covering all fields of infrastructure in domestic and overseas markets

saman
Saman Corp.

- Water Supply & Sewage/ Environment
- Water Resources
- Hydropower
- Urban Planning · Development/ Landscape Architecture
- Plant/ Maritime & Harbor
- Road Infrastructure
  (Road/Structure/Geotechnique/Transport Planning)
- Railway
- Environmental Assessment
- Construction Project Management

Basic and Detailed Design for Tidal Power Plant Const. Project in Sihwa

SAMAN, a leader of multi-disciplinary engineering company for civil engineering and environmental projects domestic and overseas

SAMAN is the best multi-disciplinary engineering company. It owns high technical and managerial competence gained from extensive experiences of national development projects, laying down the cornerstone for Korean economic growth. It has also carried out many large scaled projects globally.

Having1,200 technical personnel including 250 certified professional engineers, it has been taking a leading role in creating sustainable and eco-friendly development. It provides wide range of consultancy services under our management philosophy - " We create the world where human and nature live in harmony by technology."

Since its establishment in 1967, SAMAN has delivered many of 'the first' and 'the largest' projects in South Korea: Chungju Dam (the largest multi-purpose dam project at that time), SH tidal power plant (biggest tidal plant in the world). It also has carried out various domestic and international projects: Chungye creek restoration (Seoul, South Korea), North Ports redevelopment (Busan, South Korea), Design-Build for Sidi Abdellah New City (Algeria), Baku Metro Project for Azerbaijani capital Baku and other various infrastructure projects.

Now, SAMAN will be a sincere and reliable corporate through continuous technology innovation creating beneficial value for human and nature on the basis of the accumulated experiences, knowhow, technologies.

Water Supply and Sewage/ Environment

Water Supply & Sewage/ Environmental business Division

Introduction

Water Supply and Sewerage Division carries out research, planning, feasibility study, planning, design, supervision works analysis, also actively expanding its service to diagnose and improve the efficiency of the existing treatment facilities operation and management of such facilities, management of water supply and sewerage system. Now it is trying to expand the business territory to overseas as well.

In Environmental Department, various environmental facility design have been implemented and developed for waste water treatment from industrial complex and live stock, waste landfill and incineration facilities, recycling handling facilities and other environmental projects.

1 Water and Sewage

- Feasibility Study/ Master plan/ Water Supply System Maintenance/ Demand Forecast/Wide Area Water Supply Scheme/ Water Supply Modernization/ Basic & Detailed Design/ Technical Diagnosis/ Inundation Prevention Plan/ Water Reuse Plan/ Detailed Survey of Deteriorated Pipes

Hangang Lower Stream Water Supply System establishment (primary project) & Detailed Design for Water Treatment Facility

Detailed Design for Advanced Treatment Facility Construction(T/K) at the existing 1st and 2nd stage in Jeonju STP

Detailed Design for STP Facilities Improvement T/K project in Suyeong

Basic Design for Water Circulation System in Azerbaijan

Basic & Detailed Design for Modernization of Advanced Treatment Facilities in Jungnang Water Recycling Center

2 Environmental & Waste Management

- Livestock waste(purification,conversion to biofuel), waste water, household & industrial wastes, buffer storage for nonpoint pollutants
- Feasibility study, master plan, Basic and detailed design, turn-key project & alternative design, construction management

Basic & Detailed Design for the Livestock waste Treatment Facilities Expansion Project in Gimhae (Biogas)

Basic & Detailed Design for the Livestock waste Treatment Facilities Implementation Project in Gumi

Basic & Detailed Design for Public Wastewater Treatment Facilities in Sejong Myunghak General Industrial Complex

Detailed Design for Unsan Wetland (nonpoint pollution reduction facility) construction project in Jinan

Water Resources

Water Resources Division

Introduction

Water Resources Business Division carries out various projects performing design, supervision, and investigation of Water receiving concern all over the world due to frequent occurrence of drought and flood damages by recent abnormal climate change.

It has also carried out the projects of the entire field for water resources sector (Flood Control, Water Use, River Environment, Disaster Prevention), Such as “Flood Control Plan of River Basin”, “River Restoration and River Environmental Maintenance Design” and “Comprehensive Plan to reduce damage from storm and flood” related to 4 major rivers and major nationwide streams.

1 Flood Control/ Irrigation

- Flood Control Plan of River Basin/ Basic & Detailed Design for River Development/ River Maintenance Plan for Water Cycle/ Plan for Securing River In-stream/ Review of Water Resources Reserves and Water Balance

Basic & Detailed Design for Dongbin Inner Harbor Restoration (waterfront amusement park)

Yeongsangang 2nd-District River Environmental Improvement Project Detailed Design

2 River environment/ Disaster Prevention

- River Environmental Management Plan/ Ecological River Creation & Restoration/ Comprehensive Storm and Flood Damage Reduction Plan/ Flood Map Preparation/ Feasibility Study of Water Damage Restoration/ Storm water Tank and Pumping Station

Feasibility Study, Master Plan and Detailed Design for Najucheon Ecological River Restoration Project

Master Plan for Gulpocheon Ecological River Restoration Project

Basic & Detailed Design for Gwangjucheon Natural Stream Improvement Project

Establishment of the Comprehensive Measures for Nakdong River Flood Control System (lower stream)

Hydropower

Hydropower Division

Introduction

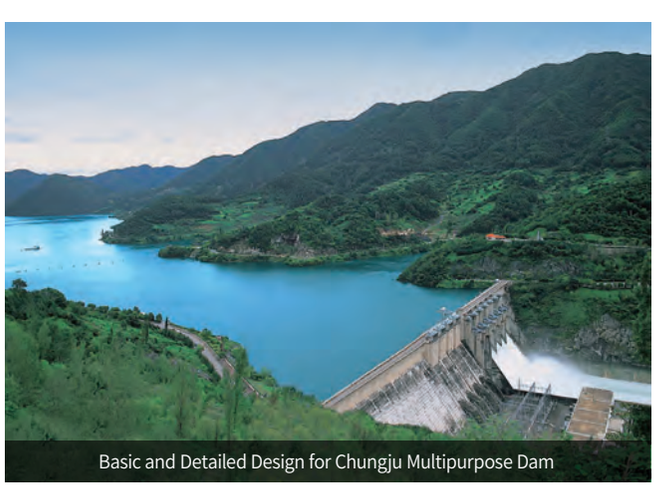
Hydropower Business Division encompasses the works of site-investigation, design, supervision and management for the construction of dams, hydropower plants and pumped storage power plants, which enable more efficient development and economic use of water resources to be made. It is currently expanding its business realm to projects for canals, tidal, renewable energy, and appurtenant facilities of nuclear power plants.

The division, which has participated in more than 60% of large dams and hydropower plants in Korea including the Chungju multi purpose dam, the largest one in Korea, and the Yangyang pumped storage power plant, also the largest in the Orient for the type. It is making efforts towards the efficient and economical utilization of water resources and its eco-environmental development with the technology and experiences acquired from the internal and for overseas projects.

1 Domestic

- Survey, Design and Construction Supervision for Water Resources and Hydropower Plant Facility/ Investigation and Evaluation of Geology and Materials/ Survey, Design and Construction Supervision for Dam and Underground Structural Works/ Turn-key

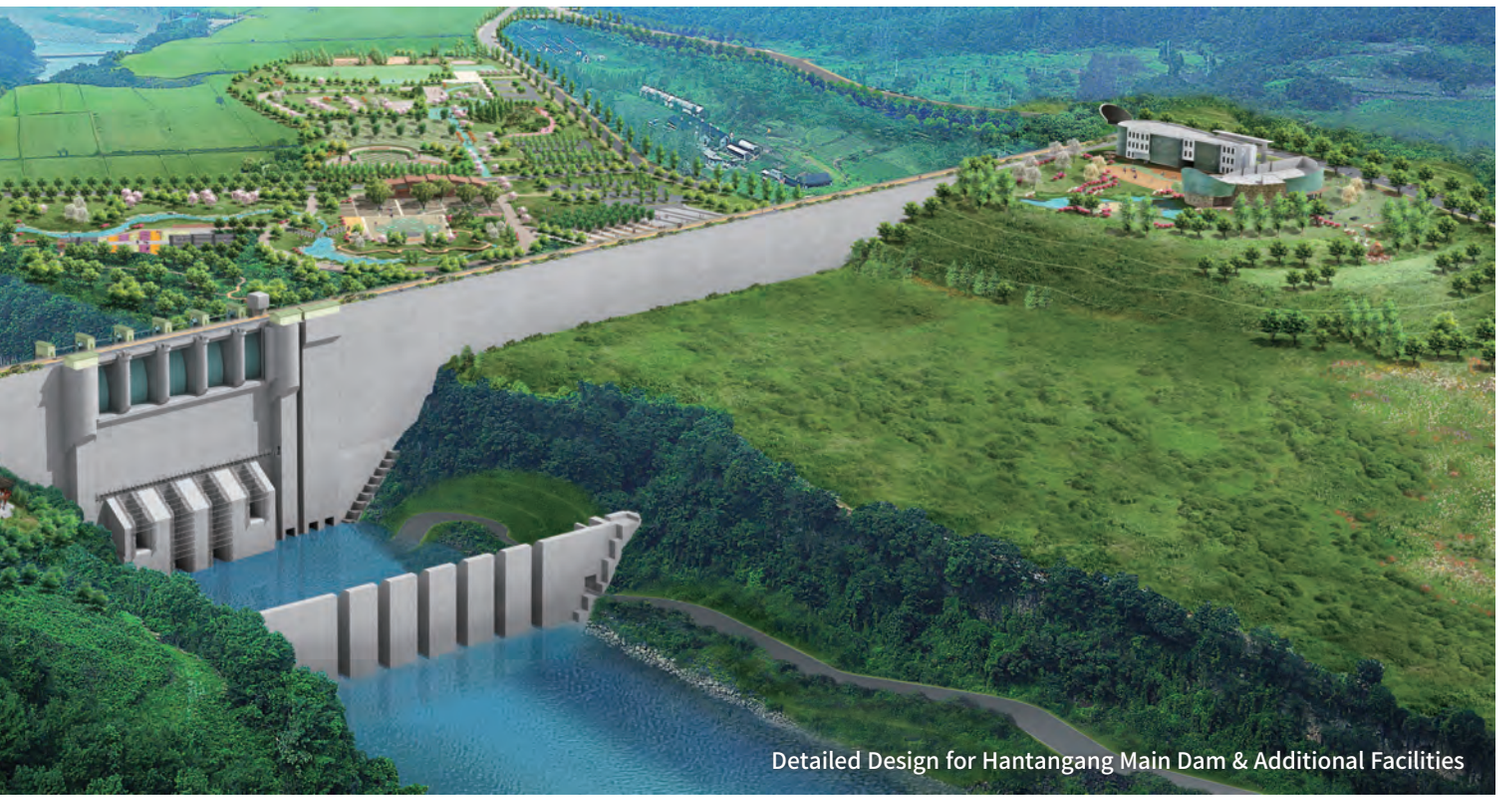
Basic & Detailed Design for Construction of Bohyeonsan Multipurpose Dam



Basic and Detailed Design for Chungju Multipurpose Dam

Alternative Design for Expansion Works of Asan Bay Embankment Drainage Gate (Phase 1)

PMC for Cheongsong Pumped Storage Power Plant Unit 1 and 2



Detailed Design for Hantangang Main Dam & Additional Facilities

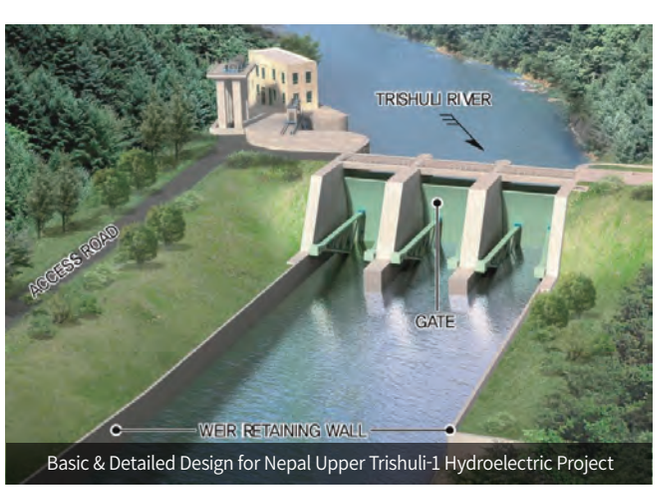
2 Overseas

- Survey, Design and Construction Supervision for Water Resources and Hydropower Plant Facility/ Investigation & Evaluation of Geology and Materials/ Survey, Design and Construction Supervision for Dam and Underground Structural Works/ Turn-key

Laos Nam Lik1 Hydroelectric Project EPC Proposal

Basic & Detailed Design for Pakistan Patrind Hydroelectric Project

Basic Design for Pakistan Gulpur Hydroelectric Project



Basic & Detailed Design for Nepal Upper Trishuli-1 Hydroelectric Project

Urban/ Landscape Architecture

Urban Planning Division/ Urban Development Division/ Landscape Architecture Division

Introduction

Urban Development Business Division carries out such engineering services as (i) national land development plan, (ii) city design for urban planning and development, and (iii) landscape design required for the development of tourism complex, leisure-sports complex, park, and cultural area.

It grew up along with the national land development history by taking part in such various major national development projects as, among others., the Multifunctional Administrative City, Namak New Town, Redevelopment of the Northern Part of Busan Port, Enterprise Cities (Muan, Chungju and Southwest Coastal Region), And the tourism complex in the eastern part of Busan. It also does its best to contribute to the creation of a beautiful county where all the people can live in harmony with nature.

1 Urban Planning

- National Land & Regional Planning/ Specific Region Construction Plan/ Provincial & County level Comprehensive Construction Plan
- Multi-level Basic Plan & Management Plan/ District Unit Plan/Feasibility Study/ Development Plan/ Implementation Plan

Establishment of Long-term Development Plan and Regional Development Concept for Sejong Administrative City

Survey and Design for Gwangju & Jeonam Joint Innovation City

2 Urban Development

- Concept Plan for Urban Infrastructure/ Feasibility Analysis/Design for Industrial Complex/Design for Infrastructure BTL/ Turn-key Project for Urban Development

Detailed Design for Songsan Green City Western District, Phase 1

Survey & Design for Development

Busan Echo-Delta City 3-section Basic & Detailed Design

- Design for International Urban Development /PMC & CM for Urban & Complex Development /Alternative Design Plan/ District Unit Plan /Feasibility Study/ Development Plan/ Implementation Plan

Master Plan for Busan Port Redevelopment

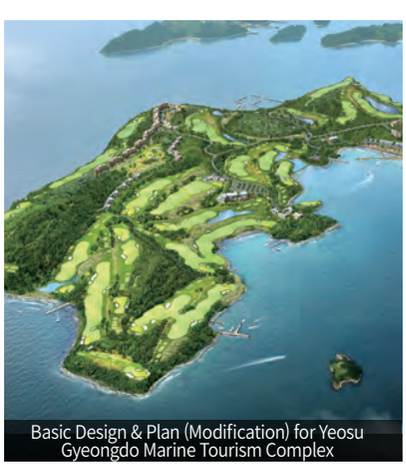
of Saemangeum Industrial Complex

3 Landscape Architecture

- Comprehensive Tourism Development/ Tour Site/ Amusement Park/ Urban Park/ Eco Park/ Leisure&Sports Complex/Forest Cultural Recreation Complex/ Feasibility Study/ Basic Plan/ Development Plan/ Basic & Detailed Design
- International Urban Development Design/ PMC & CM for Urban & Complex Development

Establishment of Development Plan for Gangdong Tourism Complex

Plan & Basic Design
For Gusan Marine Tourism Complex



Basic Design & Plan (Modification) for Yeosu Gyeongdo Marine Tourism Complex

Plant/ Maritime & Harbor

Plant Division/ Maritime & Harbor Division

Introduction

In compliance with the Government's policy to develop the coastal industrial complexes and new harbors, our Maritime & Coastal Department has carried out (i) design services for such works as reclamation, revetment and dredging required to develop super-sized coastal industrial complexes like Gunjang National Industrial Complex and (ii) comprehensive engineering services from planning and design up to supervision for the development of large new harbors like the new harbors of Mokpo, Pyeongtaek-Dangjin, Busan, Gwangyang and Gunjang. It is currently expanding its service scope to the planning, design and consulting as well related to the new and renewable energy development, improvement of ocean environment. Also, based on our well-recognized technology in Korea, we actively develop and make our way into international markets for coastal development projects.

SAMAN is carrying out design and PMC services for various plant facilities for oil and gas storage and transport facilities, environmental and waste management, electric power generation and distribution, etc. With decades of technical service experience, SAMAN offers customized services to meet the needs of clients.

1 Plant

- Oil and gas storage & transport/ Renewable Energy Facilities/ Environmental and Waste Management/ Power Generation/ Power Transmission and Distribution

Design for Yecheon Pumped Storage Power Plant Unit 1 & 2

Design for Munsan-Gaeseong Power Transmission Line Route

Survey & Design for Underground Oil Storage

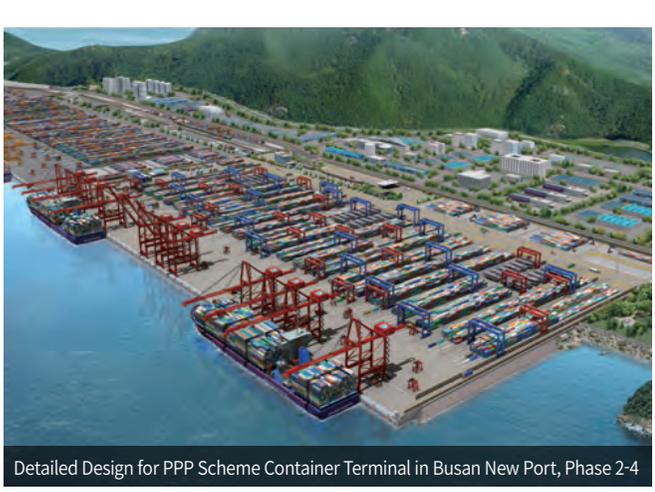
Basic Design for Pneumatic Waste Collection System in Janggi District, Gimpo City

Feasibility Study and Design for PPP Scheme Yanggok Pier Development in Pyeongtaek Port

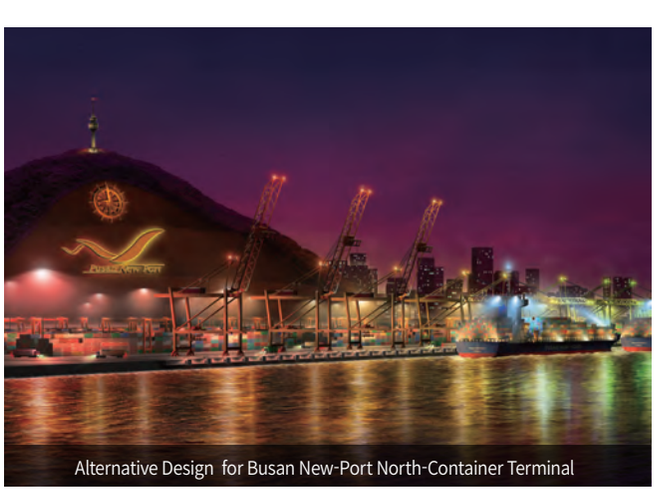
2 Maritime & Harbor

- Port facilities/Coastal industrial complex/oil storage and transport/ marine energy development/ marine environment improvement

Master Plan & District Units Plan for Busan North-Port Redevelopment



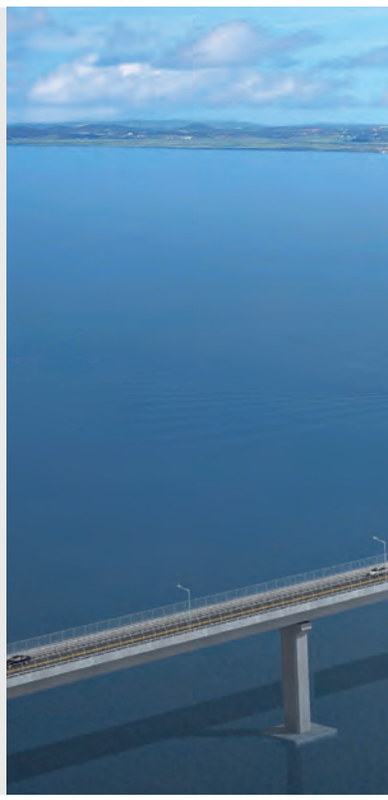
Detailed Design for PPP Scheme Container Terminal in Busan New Port, Phase 2-4



Alternative Design for Busan New-Port North-Container Terminal

Road Infrastructure

Road Division/ Structural Division/ Geotechnical Division/ Transport Planning Division



Introduction

Road Division consists of (i) Road Department (ii) Structural Department(iii) Geotechnical Department (iv) Traffic Planning Department

Road Department executes feasibility study, planning, design and supervision of various types of roads. Structural Department provides design and supervision of bridges and road structures. Geo-technical department carries out site investigation and soil test in order to use the result as basic data for various projects. Transportation Planning Department use comprehensive transportation technology and abundant project experiences in order to solve traffic problems.

In addition, the Departments have been key role to improve the transport system by providing transport planning, operation consulting, transport safety and consulting for introduction of new transportation means.

1 Road

- Feasibility study/ Basic & detailed design / Turn-key/ Alternative design/ Project management consultancy

Basic & Detailed Design for Hamyang-Ulsan Highway

Alternative Design for Namhae Highway (Naengjeong-Busan)

2 Structures

- Design Services for Special Long-span Bridges/ Roadway Bridges and Support Structures

Design services for Turn-key Project of Western Access Bridge to Gyeongnam Innovation City

Design for New Airport Highway (Banghwa Bridge) in Capital Area

Detailed Design for Gyodongdaegyo Construction Project

3 Geotechnical Services

- Design of Tunnel/ Underground storages/ Geotechnical Investigation/ Slope stability analysis

Daegu Technopolis Access-Road Construction(Lot No.1) Alternative Design

Busan Echo-Delta City Basic & Detailed Design

4 Transport Planning

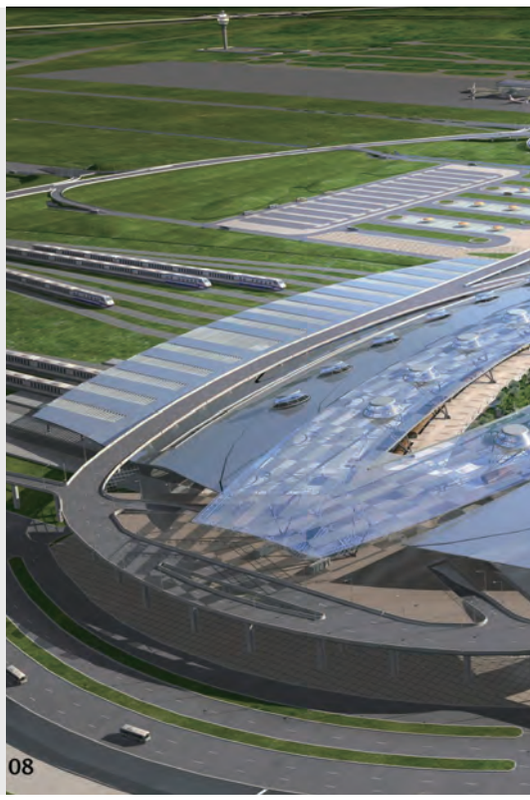
- Transport Planning/ Transport Operation and Safety/ Feasibility Assessment (New Transportation)

Traffice&Transporation System Improvement Plan in the Kimpo Airport

Seoul-Hanam BRT Demonstration Project Basic & Detailed Design

Railway

Railway Division



Introduction

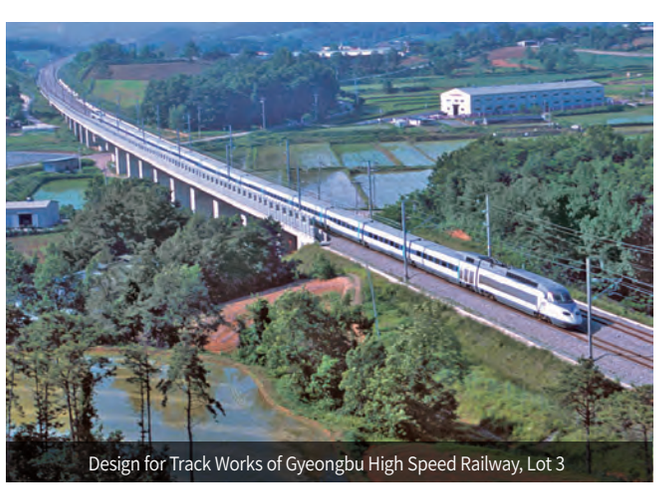
Rail Business Division carries out planning, design and supervision services of the track-related works including rail bed for high-speed railway, national main line railway, metropolitan railway and metro and also does the same services for the construction of train depots required for electric trains, high-speed trains, Light Rail Transit, locomotives, passenger/freight cars, etc. Recently we obtained the orders for the engineering services related to the railway systems in China, Azerbaijan, Algeria and Indonesia by virtue of its accumulated technology, know-how and experiences.

Railway Division has successfully completed overseas projects in Indonesia, Azerbaijan, Algeria and etc. and recently we made new contract and are expecting to make new contracts for engineering consultancy services for the projects in Sri-Lanka, Myanmar and Bangladesh.

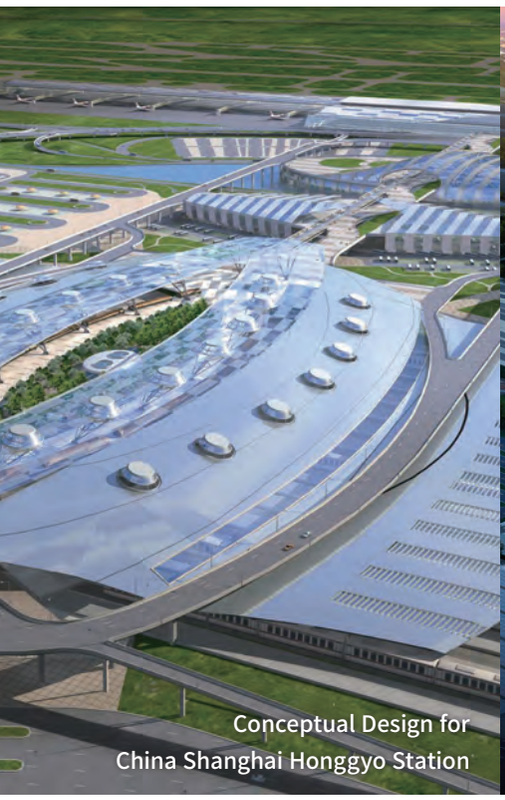
1 High-speed Railway, Conventional Railway/ Roadbed, Station, Depot and Track

- Feasibility Study, Basic Plan, Basic & Detailed Design and Construction Supervision/ Design Services for Governmental, Turn-key, & Alternative Tender, PPP, International Bidding Support


Detailed Design for Roadbed of Honam High Speed Railway, Lot 5


Design for Track Works of Gyeongbu High Speed Railway, Lot 3


Detailed Design for Construction of Depot of Seongnam-Yeoju Double Tracked Electrified Railway



Conceptual Design for
China Shanghai Honggyo Station

Architectural Design for New Jinan Railway Station of
Beijing~Shanghai High-Speed Railway

2 Urban Railway, Metropolitan Railway, LRT/ Roadbed, Station, Depot, Track

- Feasibility Study, Basic Plan, Basic & Detailed Design and Construction Supervision/ Design Services for Governmental, Turn-key, & Alternative Tender, PPP, International Bidding Support

Basic Design for Daegu Urban Railway Line No. 3

Detailed Design for Turn-key Project of Busan Urban Railway Yangsan Line, Lot 1

Incheon Urban Railway 2nd-Line Basic and Detailed Design

Northeast Line Urban Railway SOC Detailed Design

Environmental Impact Assessment

Environmental Impact Assessment Division

Introduction

Environmental Assessment Department carries out all of the environmental consultancy services for Strategic EIA, EIA, and Mini environmental impact assessments and follow-up surveys. On one hand, it tries to respond with more rigorous regulations and environment-related trade barriers. On the other hand, it seeks to minimize the possible damages to the environment in the course of development.

1 Environmental Impact Assessment

- EIA/Strategic EIA/Small-scale EIA/Post EIA

EIA for Pyeongdong Level 3 Industrial Complex

EIA for Gangneung Sports Complex

EIA for Cheongmicheon River Maintenance Project

EIA for Construction of Youngju Dam

EIA for Installation of Sacheon Ocean Cable Car

EIA for Gwangju Subway Station Area Urban Development Project

Construction Management

Construction Management Division

Introduction

Construction Management Division provides supervision of construction projects where systematic controls and management over cost, schedule, and quality. The division is capable of managing all of the project stages from the pre-design to the completion and delivery. It also offers services such as (i) study and evaluation of the existing design and construction technology and (ii) systematic management of the whole stages of a construction project.

Since the supervision consultant system legislated in 1994, the department has provided the most high-grade supervision service to all construction projects, including water supply and sewerage, road, water resource, land development, environmental facilities, maritime, railway, plant, and more.

1 Construction Management (CM)

- Preliminary Investigation/ Feasibility Study/ LCC (Life Cycle Cost) analysis/ VE/ Funding Plan/Method Selection and Management/ Project Management/ Risk Management/ Claim Management

Construction Supervision for Yongyeon·Jiwon Water Treatment Plant

Construction Supervision for Nolja Forest Development and 3 other sites

Construction Supervision for Expressway Route No.400 between Paju-Yangju

Construction Supervision for Site Renovation of Yulchon No.1 Rural Industrial Complex Phase I

2 Construction Management (Construction Phase)

- Quality Control Plan/ Design Review and Site Survey/ Quality Assurance/ Construction Management/ Design Change/ Process Management/ Safety Management/ Environmental Management/ Operation & Defect Identification

Construction Supervision for Jinju Sewage Treatment Plant Extension Phase III and application of Advanced Treatment Process

Construction Supervision for Han River Restoration Section Lot 4 (Yeoju District No.2)

Busan New Port West-Container(Step 2-5) Expansion Construction Management

Gangneung An-In Thermal Power 1,2 Construction Management

Intellectual Property

New Excellent Technology/ Patent/
Trademark and Design/ Software copyright


Ground Improving

Introduction

SAMAN R&D Center implements requisite technologies by the projects of diverse construction engineering. It is developing technologies for design and management, knowledge management system that accorded with development of core design technology, New Excellent Technology and Process, introducing advanced technology, VE and design automation S/W.

At the same time, we are exerting every effort to the development of future growth engines to cope with the 4th industrial revolution such as eco-friendly and renewable energy, facility maintenance and safety diagnosis, U-City with convergence design technology with IT technology.

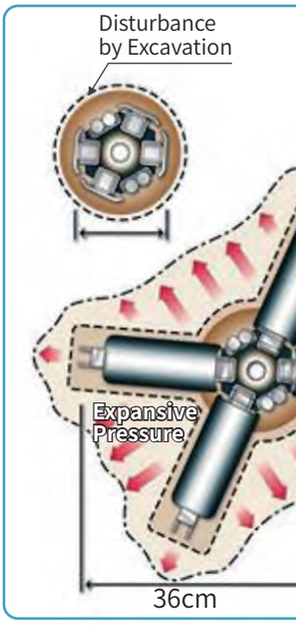
1 New Technology (7 EA)

Name for Technology / Inventor	Reg. No.	Validity
Removable Ground Anchor Method for Soft Ground using Unfoldable Wing (Wing Wing Anchor Method) SAMAN Corp. / Jang Pyoung Construction Co., Ltd./ POSCO E&C	No. 652	'12/ Apr/ 26 ~ '23/ Apr/ 25
Ground Anchor Method using the Anchor Extended in Two-Steps. (EJP Method) SAMAN Corp. / Jang Pyoung Construction Co., Ltd./ POSCO E&C / Korea Construction Management Corporation	No. 737	'14/Jul/ 29 ~ '22/Jul/ 28
Precast Concrete Slab method for Bridge using Reinforced Rib & Haunch and Corrugated Shear Connector (Rib-Deck Method) SAMAN Corp. / WOOJIN Industries Co., Ltd. / Korea Engineering Consults Corp.	No. 751	'14/ Dec/ 22 ~ '22/ Dec/ 21
Manufacturing and Installation method for Hydraulic Integrated Water Gate without structure of hauling facility above gate SAMAN Corp. / WOOJIN Industries Co., Ltd. / Korea Engineering Consults Corp.	No. 761	'15/ Apr/ 01 ~ '23/ Mar/ 30
Soil improvement method for buildings subjected to low upper load by forming a hard soil-mass with tapered shape under the ground (PF Method) SAMAN Corp. / EXT Co., Ltd. / POSCO E&C / Daelim Industrial co., ltd	No. 861	'17/ Jun/ 01 ~ '25/ May/ 31
Precast Pretensioned Concrete Half-Depth Deck Panel Method using Deformed Bars with Enlarged Circular Head and Anchorage Device SAMAN Corp. / JANGHEON E&C / HANMAC Eng. Co., Ltd. / HALLA E&E	No. 852	'18/ Nov/ 19 ~ '26/ Nov/ 19
Manufacturing and Installation Method for Mechanical Multistage Overturing Movable Weir SAMAN Corp. / ILLSUNGBO Industrial Co., Ltd.	No. 53-1	'13/ Dec/ 05 ~ '19/ Dec/ 04

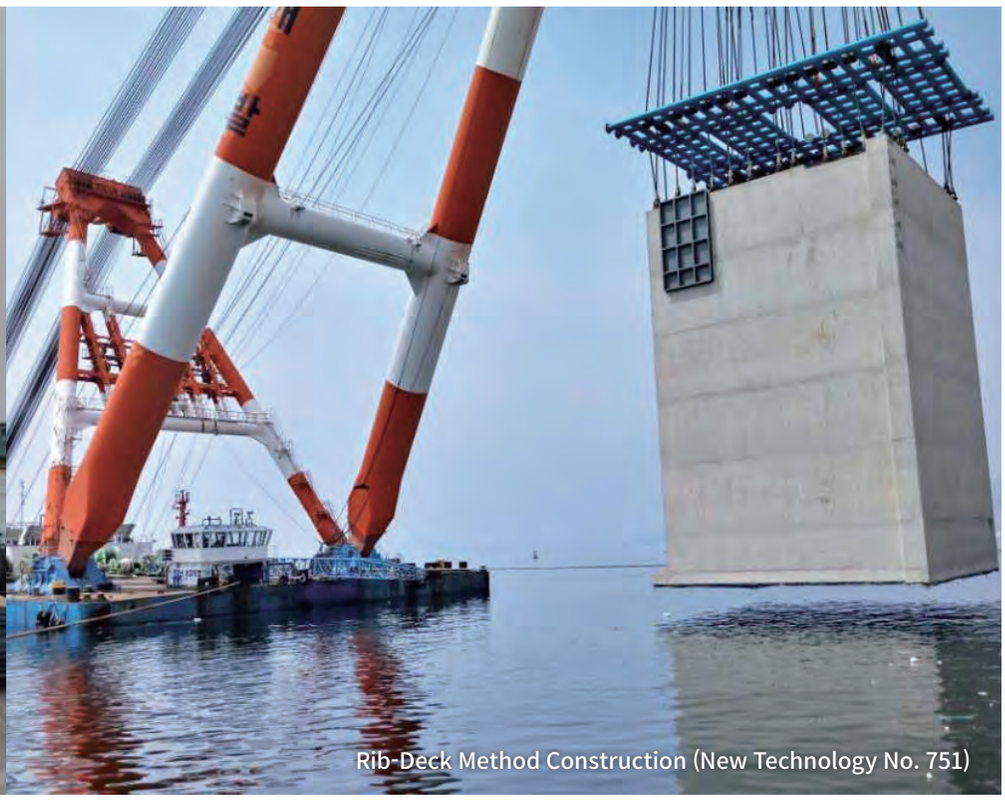
2 Patent (167 EA)

<Major Patent>

- No. 10-1462827 :
- No. 10-1048802 :
- No. 10-0914772 :
- No. 10-0707340 :
- No. 10-0723259 :
- No. 10-0474261 :



Method for Low-weighted Structure



Rib-Deck Method Construction (New Technology No. 751)

Asphalt mat for increasing friction and its manufacturing method

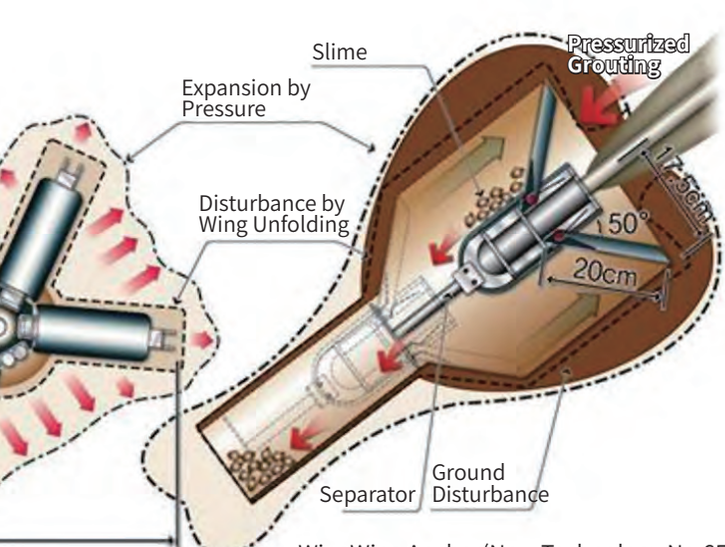
Construction Method for Raising Earth Dam

Storm Water Storage Facility utilizing Aquatic Plantation in Housing Site Development Complex

Gravity Type Breakwater using Asphalt mat for increasing friction

Installation System for River Bank Leak-proof Impermeable Membrane

Design System and Method of Horizontal Alignmentfor Metro and Railway



• WingWing Anchor(New Technology No.652)

3 Trademark and Design (4 EA)

Product Name	Reg. No.	Copyright	Remark
IPIPE	40-0750341	SAMAN Corp.	Trademark
IPIPE	6244859	SAMAN Corp.	Trademark (China)
Top plate for monorail	30-0532036	SAMAN Corp. B.Y.Joo	Design
Top plate attachment to steel Beam for monorail	30-0532035	SAMAN Corp. B.Y.Joo	Design

4 Software Copyright (172 EA)

Software Name	Reg. No.
Library for General and Railway Linear	2005-01-199-000952
BlueHAlign v1.2	2005-01-199-000954
BlueTrack v4.0	2006-01-181-004663
Eclipper 2006	2006-01-181-004664
BlueTPS Pro v1.3	2006-01-181-004665
BluePLD v1.0	2006-01-181-004666
OrangePipe v1.0	2006-01-181-005051
IPIPE v1.0	2007-01-181-003994
BlueRTM v1.0	2007-01-189-005144

HANMAC
ENGINEERING

- **Design Business Division**
  (Road/ Structure / Ground/ Tunnel/ Transportation)
- **Land and Environment Business Division**
  (Environmental Assessment/ Urban Planning/
  Water resources/ Water Supply & Sewerage)
- **Construction Management Business Division**
  (Construction Management/ Safety Inspection & Assessment)

Gwang-Am Bridge

Civil Engineering, Planning, Design, Construction Management, New Technology Development

Since its establishment in May 1996 as an Engineering Consultant, HANMAC has been providing the services of design, construction management, and evaluation in the field of Road & highway and Environment.

Currently, HANMAC is making an effort to diversify business fields to Water supply and Sewerage, Water resource, Urban planning. In particular, HANMAC plays a leading role in the Private Investment Project (PIP) for new road constructions. It also tries to offer better values through new technologies.

Moreover, Research & Development are persistently strived in cooperation with the R&D Center to develop more advanced and easily adaptable technologies for BIM and other engineering software. In addition, finding for various areas of investment projects are underway: for example, Urban Parking Lot, Roadside Rest Station, and Automobile Driving Test Facilities, etc.

Design Business Division

Road/ Structure/ Ground/ Tunnel/ Transportation

Introduction

HANMAC provides overall consulting services for road, highway and transportation sectors in the form of Direct Investment, Design Services for Turn-key projects and Alternative Design.

Especially in the field of private investment projects, HANMAC's creative thinking and the best technology have contributed to the development of national road and transportation. HANMAC will consistently play a leading role based on the superb experience and technology accumulated in consonance with the eco-friendly SOC strategy of Korean Government.

In collaboration with the R&D Center, we are preparing for a digital transformation towards innovation in the civil industry through BIM Design and 3D Simulation.

1 Road

- Feasibility study/ Basic & detailed design/ Private Investment Project(PIP)/ TK & Alternative design/ International Project

Detailed Design for Incheon-Gympo Highway Private Investment Project

Detailed Design for Guri-Pocheon Highway (Namguri IC) Private Investment Project

2 Structure

- Private investment Project/ Basic & Detailed Design/ Special Purpose Structure/ TK & Alternative Design/ International project

Incheon New Port Accesss-road and Shore Protection Construction T/K

Songsan Green City-Sihwa MTV Cross-road Construction T/K

Seopyeongtaek JCT

3 Ground and Tunnel

- Ground Survey/ Tunnel & Underground Structure/ Basic Design of Structure/ Slope Design/ Soft Ground Improvement Survey/ Temporary Earth Retaining Structure/ R&D

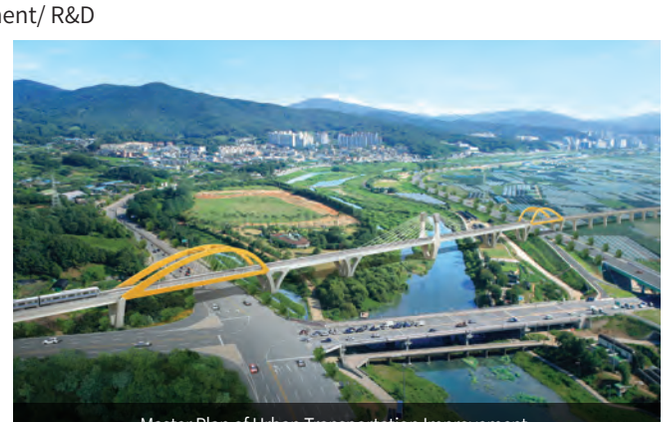
Incheon Tunnel

Guri Tunnel

4 Transportation

- Feasibility study / Demand forecasting and feasibility analysis/ Master plan of urban transport management / TSM/ ITS and New Transportation System/ Traffic Impact Assessment/ R&D

Traffic Impact Assessment



Master Plan of Urban Transportation Improvement

Land & Environment Business Division

Environmental Assessment/ Urban Planning/
Water resources/ Water Supply and Sewerage

Introduction

For both public and privately-funded projects, HANMAC provides engineering services such as design and environmental impact assessment for environmental infrastructures. Its urban design utilizes innovative planning techniques to make efficient land use and an eco-friendly city into reality.

Also, HANMAC is striving for sustainable development of flood prevention and pursuing efficient water use in the water resource field, and provide the complete design for water supply and sewerage systems.

1 Environmental Assessment

- (Strategic) Environmental Impact Assessment/ Environmental Conservation Plan/ Post Environmental Impact Assessment/ Environmental Review/ Integrated Environmental Management

Post EIA for Samcheok Station

Post EIA for Urban Development in Gwangyo Region

2 Urban Planning

- Urban Master and Management Plan/ Urban Regeneration/ Urban Development/ Industrial Complex Development/ Tourism Area Development/ Green Park Master Plan/ Park Development Plan/ Landscape Design

Songjeong District Units Plan

Songsan 2nd-Industrial Complex Construction Project

Post EIA for Incheon International Airport

3 Water Resources

- Basic and Detailed Design for River Restoration/ Ecological River Restoration/ Design of River Improvement/ River Master Plan/ Tributary River Master Plan/ Pre-Disaster Impact Assessment

Nakdong River Restoration Project (Lot. 38~40)

Detailed Design of Hometown River Improvement Project in Chatan River

4 Water Supply and Sewerage

- F/S and M/P for Water Supply and Sewerage/ Basic and Detailed Design/ Technical Audit for Water Supply and Sewerage facility

Drainage Pumping Station

Gyeonggi Hwaseong Bio Valley

Construction Management Business Division

Construction Management/
Safety Inspection & Assessment

Introduction

Our highly competent technicians and accumulated management skills will provide optimized consulting services in design review, construction planning, process management, quality control and cost estimation.

And we are pursuing various tasks that ensure the utility of the facility and public safety, such as regular safety checks on structures under construction, precise disaster prevention, inspection and facility diagnosis.

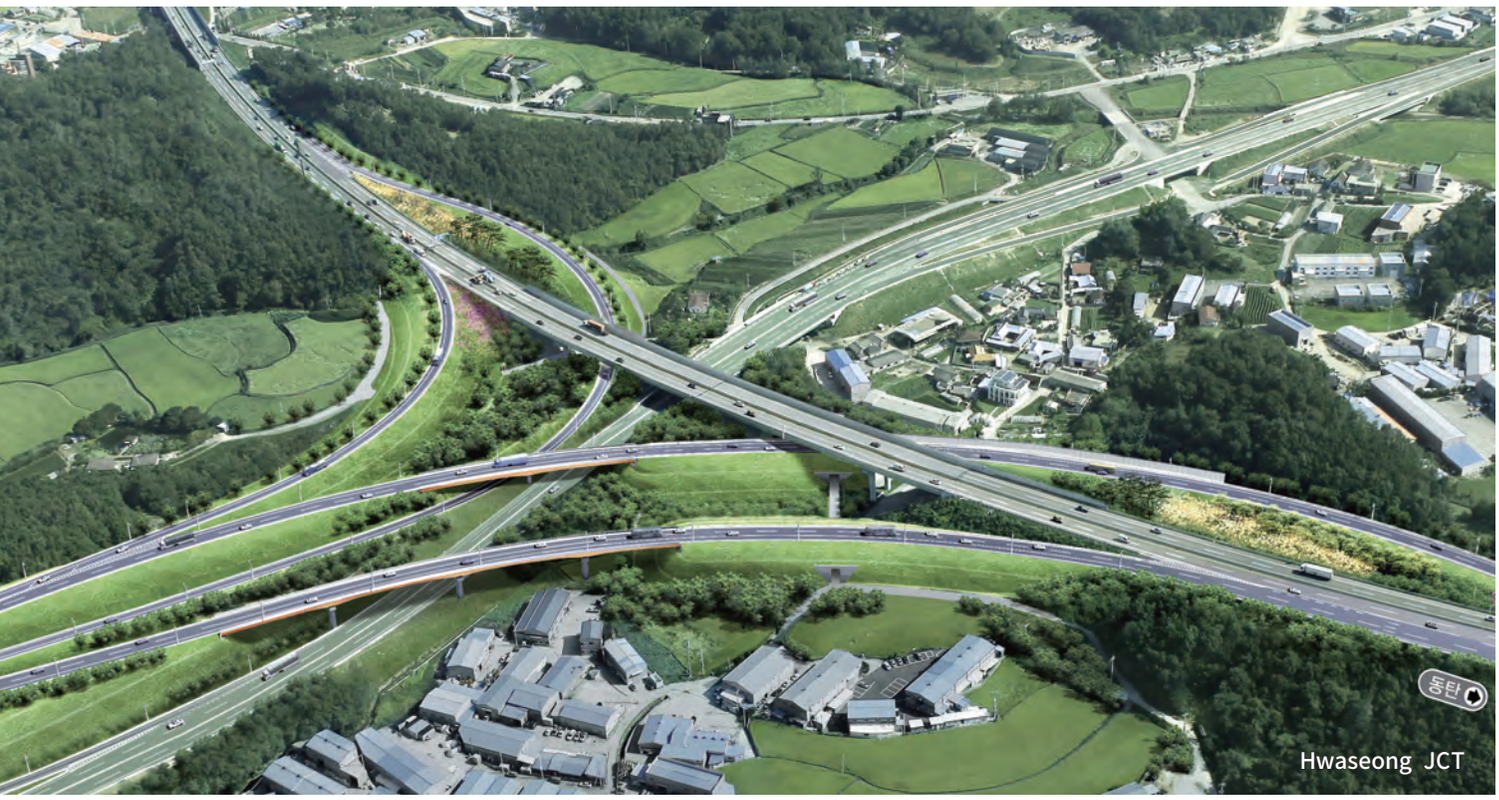
1 Construction Management

- Road/ Port/ Railway/ Building, Electric Works, Communication, Landscaping Construction Management

Construction Management
for Bongdam-Songsan Highway Private Investment Project

Construction Management
for Jeonju-Gwangyang Highway Private Investment Project

Construction Management for Pyeongtaek-Siheung Highway (Sihwadaegyo) Private Investment Project



- New Port Development/ Design Supervision an Technical Audit for Port Facility


Construction Supervision of Port Breakwater and Wavebreaker of Yeongil Bay Port in Pohang

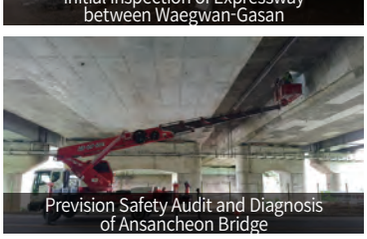

Construction Management and the Acting Project Director of Dredging the New Port of Busan (Phase II)

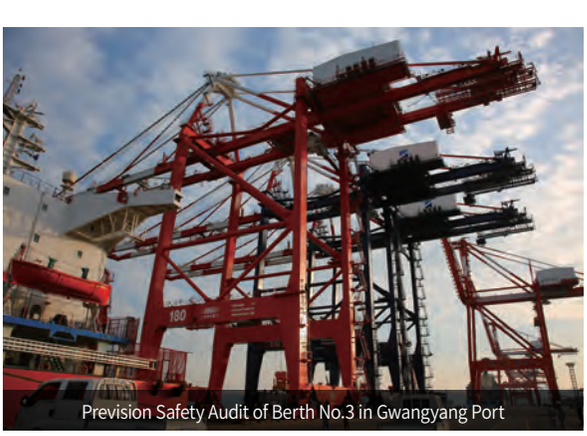
2 Safety Audit

- Initial Facility Inspection / Regular Safety Audit / Prevision Safety Audit and Diagnosis / Facility Maintenance and Repair, Improvement

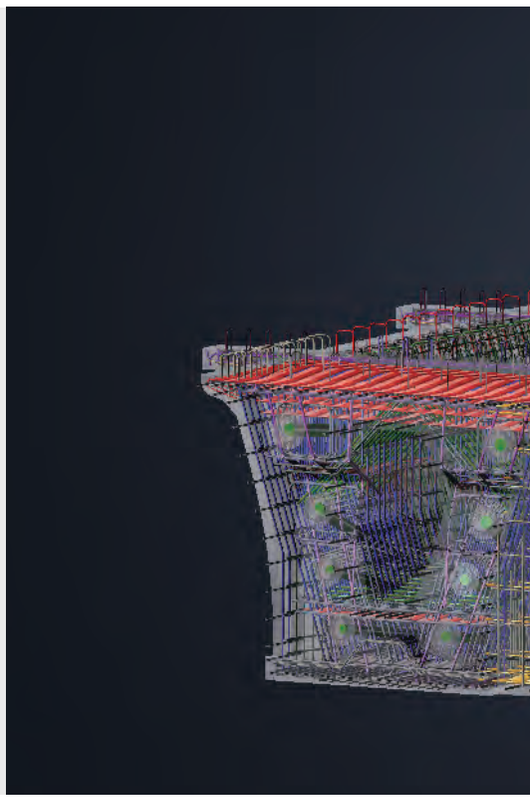

Initial Inspection of Seoul Metro Line No.9 Phase III (Lot. 919)


Initial Inspection of Expressway between Waegwan-Gasan


Prevision Safety Audit and Diagnosis of Ansancheon Bridge


Prevision Safety Audit of Berth No.3 in Gwangyang Port

R&D/ Business Development



Introduction

HANMAC has participated in various projects such as leisure park and parking lots, smart cities (R&D), an international competition for a leisure complex, riverbank restoration projects, etc.

In addition, HANMAC has designed numerous driving test tracks for vehicles, which required a higher level of technology. Its past projects include automobile driving test site for Hankook tire & Hyundai Motors, Mohave driving test site in the USA and a driving test site in Kotamadya Bekasi City, Indonesia.

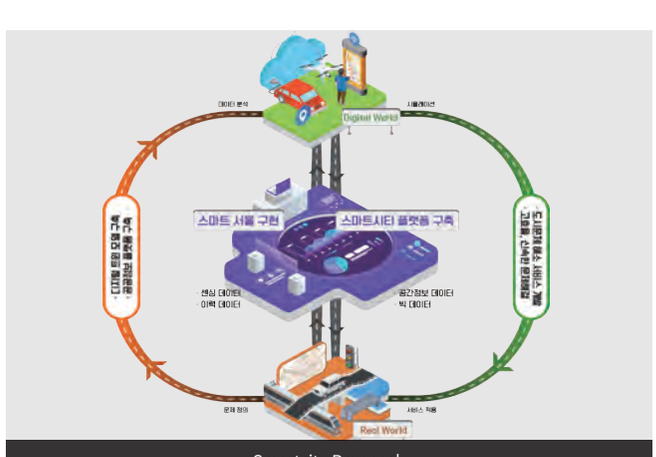
1 R&D (collaboration with the R&D Center)

GSIM-Geo & Structure Information Modeling

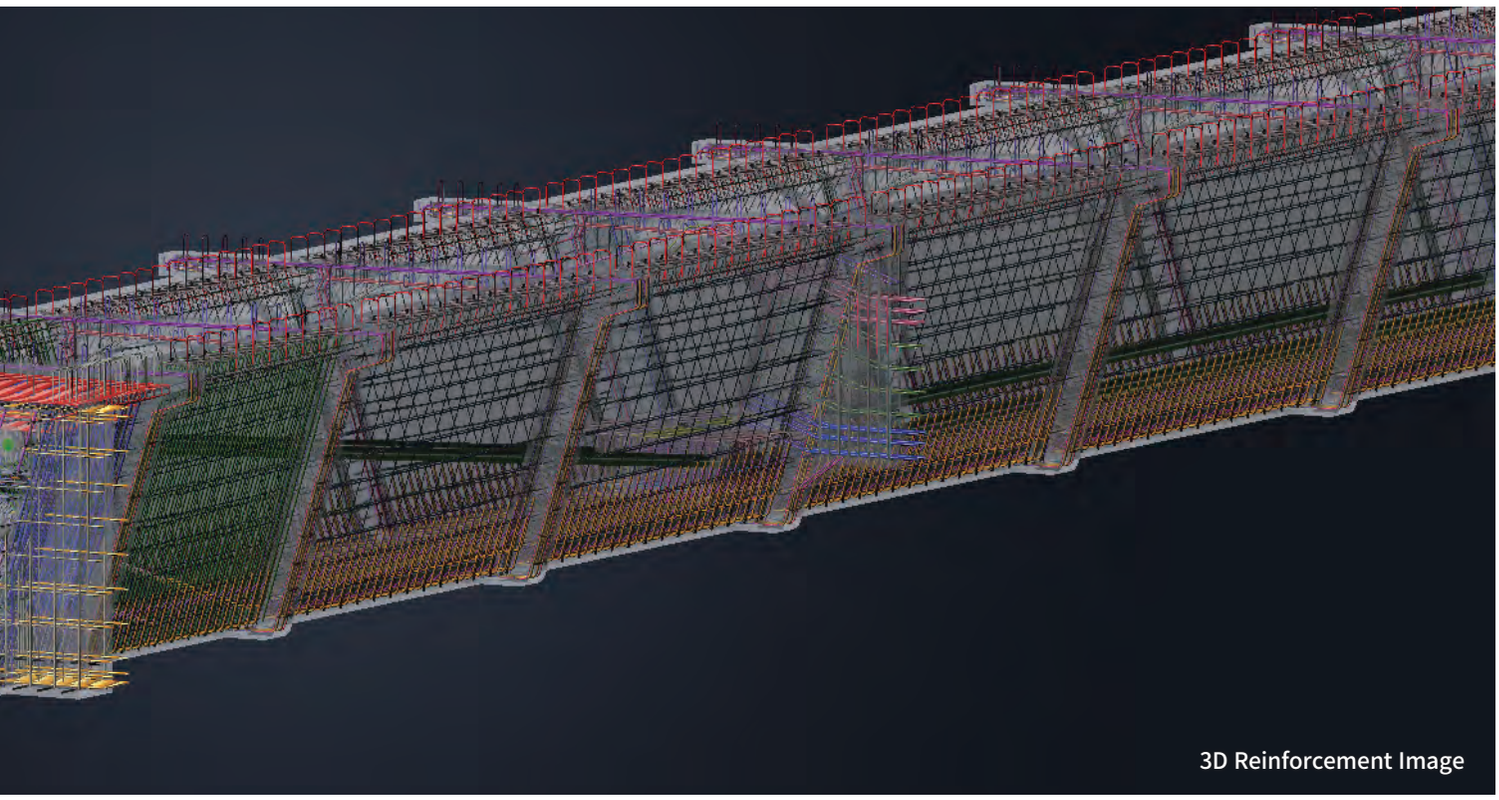
Daejeon Do-An 3D Simulation

2 Public Contest

Changdong-Sanggye Cross-Bridge Contest



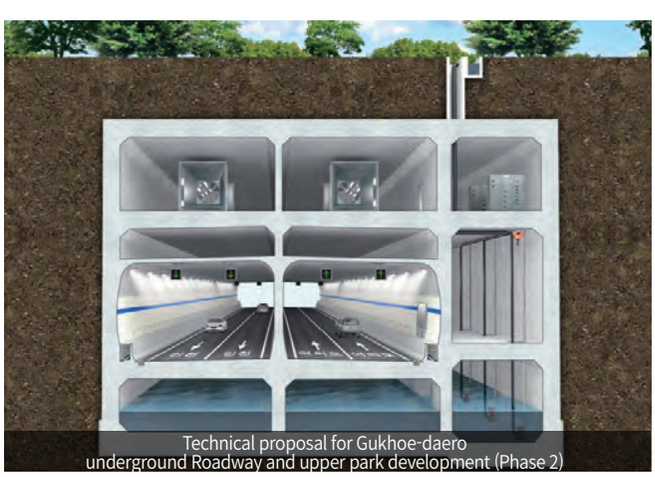
Smartcity Proposal



3D Reinforcement Image

3 Development Proposal

National Highway No. 43, Rest Area



Technical proposal for Gukhoe-daero underground Roadway and upper park development (Phase 2)

4 Proving Ground

Mohave Proving Ground (US)

Hyundai Namyang Laboratory

Intellectual Property

Patent/ New Technology/ Design Right

Introduction

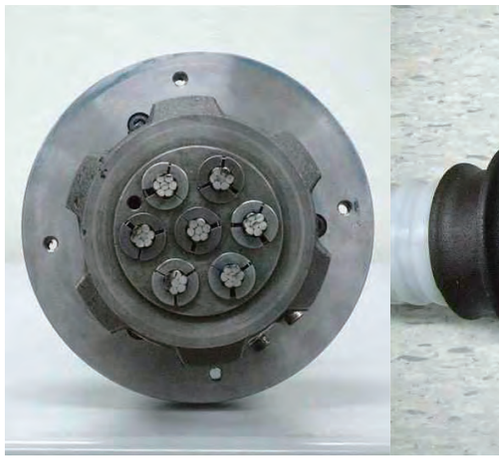
HANMAC continually researches and develops design technologies necessary for various fields of civil engineering. It is striving to innovate beyond the existing design construction methods such as specialized construction methods, design automation software development.

HANMAC also explores next-generation technologies such as eco-friendly & renewable energy, smart construction, IT convergence Design, etc.

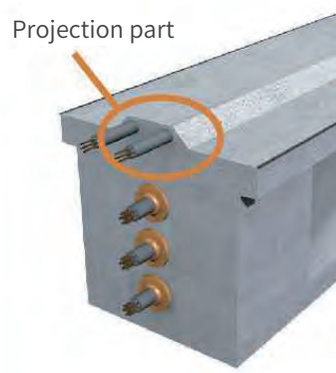
1 Major Patents (40 EA)

Name of Patent / Company	Reg. No.	Validity
Precipitation system	No. 10-0761457	2020.09.18
Joint piloting device and construction method	No. 10-0918774	2020.09.16
Filtration system	No. 10-0745121	2020.07.26
Water treatment system(1)	No. 10-0745120	2020.07.26
Water treatment system(2)	No. 10-0745120	2020.07.26
Coolant circulation rotating poking device of incinerator	No. 10-0305002	2020.07.25
Construction method of composite rahmen bridge with low girder depth and long-span subsequent to moment redistribution	No. 10-0742206	2020.07.18
Method of elimination of vibration created during rock mass blasting using oil tubes	No. 10-0431905	2020.05.06

- DR Girder new Technology
(allowing tendon adjustment in the upper er



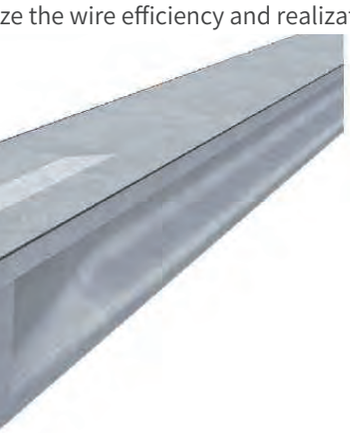
- With installation of Protrusion to maximize t
of low profiled long span



Incheon New Port Access-Bridge (New Exellent Technology Application)

er end girder depth)

ze the wire efficiency and realization



2 New Technology (3EA)

Name for Technology / Inventor	Reg. No.	Copyright
DR Girder - Prestressed concrete girder construction method using a system allowing tendon adjustment in the upper end girder depth	No. 582	HANMAC JANGHEON DONGBU
Compound Pile - Prestressed concrete girder construction method using a system allowing tendon adjustment in the upper end girder depth	No. 556	HANMAC DOOSAN PTC KECC
Pretensioned PSCI type - End girder depth expansion type pretensioned PSCI type girder manufacturing with the application of onsite assembly type steel reaction bed and steel wire unbonded method	No. 752	HANMAC JANGHEON

3 Design (4EA)

Design Name	Reg. No.	Copyright
LED signage using solar cells	No. 30-0566059	HANMAC
Steel Bridge Cross Beam	No. 30-0415671	HANMAC
Top Overhanging Flange PC Girder	No. 30-0415670	HANMAC
Half section of PC slab	No. 30-0410343	HANMAC

HALLA

Energy & Environment

- **Environment Plants**
- **Industry Plants**
- **Energy Plants**
- **Civil & Architecture**
- **Operation & Maintenance of Facilities**

Goseong High Thermal Powerplant

EPC Project Execution and New Excellent Technology Development for Environmental Facilities

Environmental & Construction Division of HALLA HEAVY INDUSTRY had been spun off into HALLA Energy & Environment, which company newly founded in 1999.

HALLA E&E has been a significant player in several industrial sectors; Environment Plant (Air, Waste, Water), Industrial Plant, Power plant, Civil& Architecture, and Plant Operation & Maintenance. Since its establishment, HALLA E&E has successfully built and operated numerous environmental plants (incinerator, waste, and water treatment plant) in an eco-friendly manner, which made meaningful changes in people's negative perceptions against environment plants.

HALLA E&E is a leader of the environmental industry in Korea. HALLA E&E has been recognized for superior technology and achievements; the company has won various awards in the environmental field, including the awards by the Minister of Environment and the President of Korea.

Environmental Plants

Air Pollution Control/
Wastewater Treatment/ Waste Recycling

Introduction

"Resource Recovery, Clean & Clear Water, HALLA E&E ."

To achieve an abundant future, HALLA E&E prioritizes the harmonious coexistence between human and nature. Having put this value first, HALLA E&E will become a pioneer in the environment and energy sector, integrating green technologies into all possible services.

1 Air Pollution Control

- Flue Gas Desulfurization System

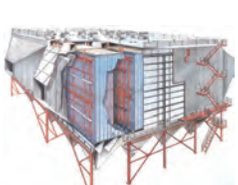
Boryeong Thermal Power Plant #7,8 Flue Gas Desulfurization System

- Electrostatic Precipitator/ Fabric Collectors

Yeosu Thermal Power Plant #1 Flue Gas Desulfurization Facilities

- Flue Gas Denitrification System(First SCR in Korea)

Samcheonpo Thermal Power Flue Gas Desulfurization



Electrostatic Precipitator

Fabric Collectors

- Electrostatic Precipitator/ Fabric Collectors

Yeongheung Thermal Power 1~4 Electrostatic Precipitator

Jungnang Water Recycling Center

2 Water Treatment

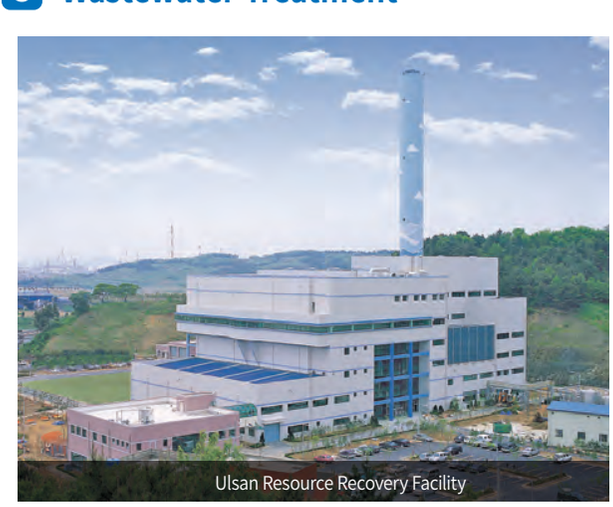
- Sewage Treatment

Anseong Buldang Sewage Treatment Plant

- Wastewater Treatment

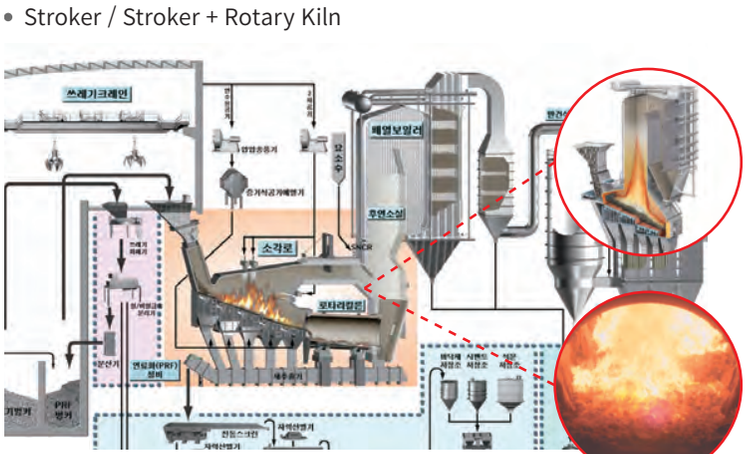
Paju LCD Industrial Complex Waste Water Treatment Plant

3 Wastewater Treatment



Ulsan Resource Recovery Facility

- Stroker / Stroker + Rotary Kiln



Industrial Plants

Cement Plant/ Unloading & Conveying Facilities/ Ash Collection

Introduction

HALLA E&E is proud to be named for inheriting the development history of the plant industry in Korea. HALLA E&E has completed numerous large scale cement plants in both Korea and overseas, including Saudi Arabia and Malaysia.

HALLA combines its technologies and experiences to provide reliable services of bulk material handling system (Ash, Coal, Biomass) and Loading & Unloading Equipment, Coal Depot, Logistics Terminal.

1 Cement Plants

- Successfully Completed and Supplied many large-scale cement plants and supplied production facilities. Such as, La Farge Halla Cement, Saudi SPCC, Malaysia NSCC

La Farge Halla Cement Main Plant

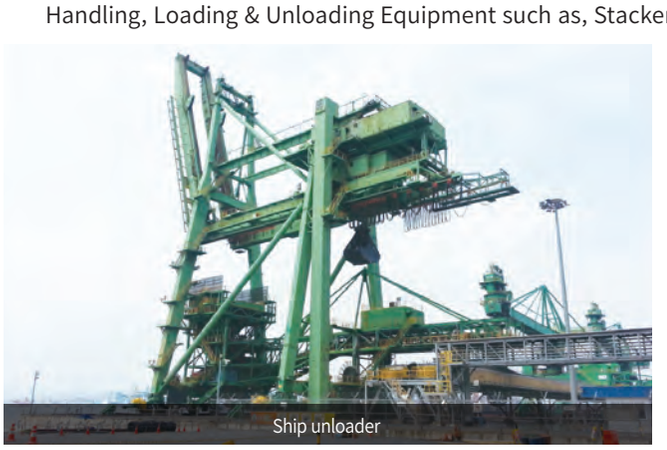
Halla Cement Okgye Factory

La Farge Halla Cement Harbor Plant(5,500t/day)

Okgye La Farge Halla Cement

2 Material Handling, Loading & Unloading Equipment

- Based on advanced technology and abundant production experience , Halla is also manufacturing the Material Handling, Loading & Unloading Equipment such as, Stacker, Reclaimer, Crane, Conveyor, LLC, Unloader



Ship unloader

Goseong High Thermal Power Facilities

3 Ash Handling System

- An ash handling system collects and transports the bottom ash and the fly ash generated in coal fired thermal power plants to ash pond or ash storage silo

Yeongheung Thermal Power Fly Ash Silo

Yeongheung Thermal Power #1,2 Ash Ash Handling System

Energy Plants

Renewable Energy Facilities/
Power Generation Facilities

Introduction

Focusing on the global energy transformation, HALLA E&E proposes both a new vision and direction to future clean energy, targeting the global market with accumulated technologies and know-how.

HALLA E&E delivers qualified facilities in its capable hands for clients.

1 Renewable Energy Facilities

- Refuse Derived Fuel Cogeneration

Wonju RDF

- Cement Cogeneration

Halla Cement Okgye Factory

- Wind/Solar/Sunlight Power Facilities

Changjuk Wind Power

Onsan Bioenergy Facilities

Saemangeum Marine Wind Power

2 Power Generation Facilities

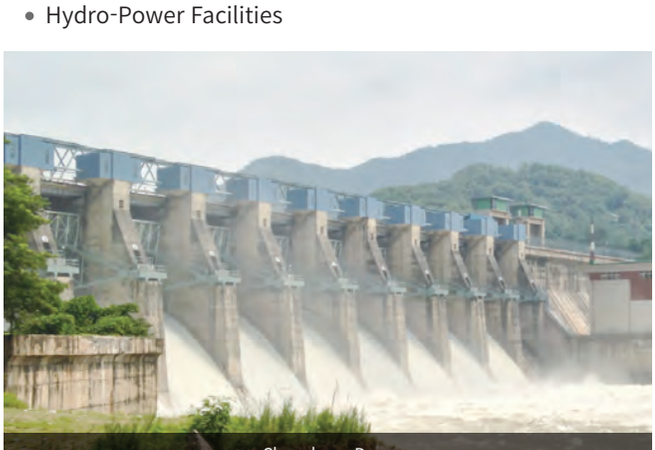
- Small Hydro-Power Facilities

Samcheonpo Marine Small Hydro-Power Facilities(1000KW x 6 Nos.)

- Thermal Power Facilities

Yeongheung Thermal Power Facilities

- Hydro-Power Facilities



Chuncheon Dam

- Community Energy Supply System(CES)

Iksan 2nd Industrial Complex Group Energy Supply Facilities

Civil Engineering/ Architecture

Introduction

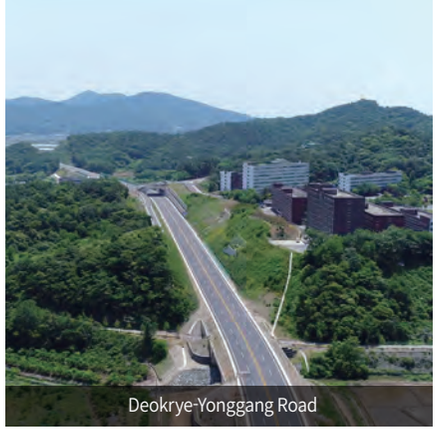
"Well-being Human City – HALLA E&E."

Civil Works Division provides infrastructure construction services with abundant skill, knowledge, and experience. We have many achievements in the field of road, railway, and bridge. We want to build up good relationships with clients by providing high-quality design, construction, and post-build services.

Architecture Division has various building construction records showing its capability to meet user's satisfaction. Its mission is to create valuable spaces for our customers.

1 Civil Engineering

- It provides comprehensive construction service such as design, construction, after-services in civil infrastructure with the technical excellence in civil engineering



Deokrye-Yonggang Road

Gamil-Choi Road

Samho Dockyard

Seocheongyo (Cable-stayed Bridge)

Halla Nocturn Apartment

2 Architecture

- Balanced Architecture between human and nature : Pleasant living environment such as apartment, studio, high-technology complex/ cultural complex and business space


Global Research & Education Facilities


Dongtan A7bl Apartment (Hwaseong City)

Operation & Maintenance

Introduction

"Wealth Knowledge & Knowhow – HALLA E&E."

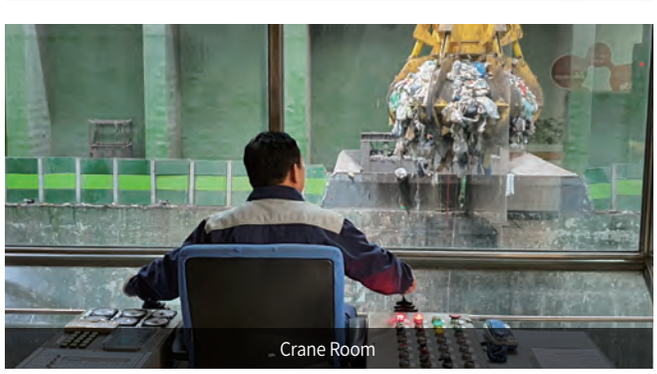
HALLA E&E is operating the largest incineration facility and having the largest number of facility operation records in Korea. In addition, it has an outstanding record of the most extended incineration facility operation period in Korea.

The accumulated know-how from the operation experiences of resource recycling facilities such as incinerators, sewerage treatment, food waste helped to develop new technologies, process improvement, and management cost savings of facilities.

1 Facility Management Business

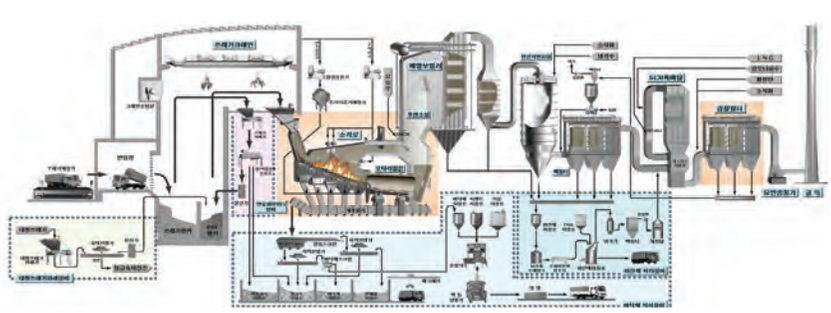
Gangnam Management Center

Control Room - DCS



Crane Room

Periodic Maintenance

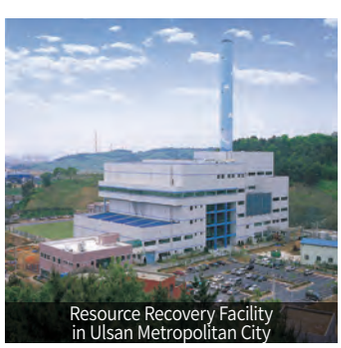


Mapo Resource Recovery Facility

2 Major Management Experience

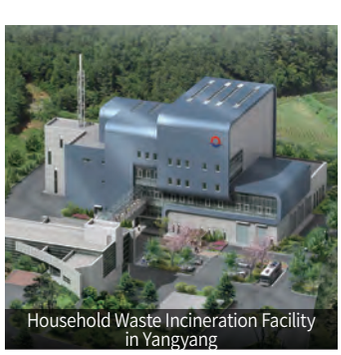
	Project	Size / Specification
1	Resource Recovery Facility in Gangnam	300 tons / day * 3 Nos.
2	Resource Recovery Facility in Mapo	250 tons / day * 3 Nos.
3	Environmental energy facility (600 tons) in Seongnam city	250 tons / day * 3 Nos.
4	Resource Recovery Facility in Ulsan Metropolitan City	250 tons / day * 1 No. 200 tons / day * 2 Nos.
5	Waste incineration facility in Chooncheon city	Incineration (170 tons / day * 1 No. Recycle) 60 tons / day
6	Resource recovery facility in Seongsan-gu, Changwon city	200 tons / day * 2 Nos.
7	Household waste incineration facility in Milyang city	50 tons / day * 1 No.
8	Resource recovery facility in Anseong city	50 tons / day * 1 No.
9	Household waste incineration facility in Yangyang city	30 tons / day * 1 No.
10	Incineration facility in Yesan-gun	40 tons / day * 1 No.
11	Bio-Energy Center in Onsan-eup	Food waste 100 tons Livestock excretions 50 tons
12	Incineration facility in Hongcheon-gun	30 tons / day * 1 No.
13	Waste incineration facility in Asan city	200 tons / day * 1 No.
14	Clean tower in Pangyo, Seongnam city	45 tons / day * 2 Nos.
15	Incineration facility in Yeongdeok-gun	20 tons / day * 1 No.

Household Waste Incineration Facility in Milyang



Resource Recovery Facility in Ulsan Metropolitan City

Clean Tower in Pangyo, Seongnam city



Household Waste Incineration Facility in Yangyang

Resource Recovery Facility in Anseong city

Resource Recovery Facility in Seongsan-gu, Changwon- city

JANGHEON
ENGINEERING & CONSTRUCTION

- **Nodular Girder**
- **DR. Girder**
- **Dr. Spliced Girder**
- **Other Construction Method**

Sihwa grand bridge

Construction and Development of New Technologies for Bridges and Structures

JANGHEON, since its establishment in 2005, introduced numerous innovative products and technologies in precast concrete bridges.

Its first product was DR Girder, which features innovative adjustable tension wires. More products have been developed in succession including Nodular Girder, DR Spliced Girder, Pre Girder, DR Wide Flange Girder, and Pre Deck.

JANGHEON is still investing much of its corporate resources in innovating engineering and construction technologies to elevate its competitiveness in the bridge construction sector.

Nodular Girder

Nodular Girder with PSC Web

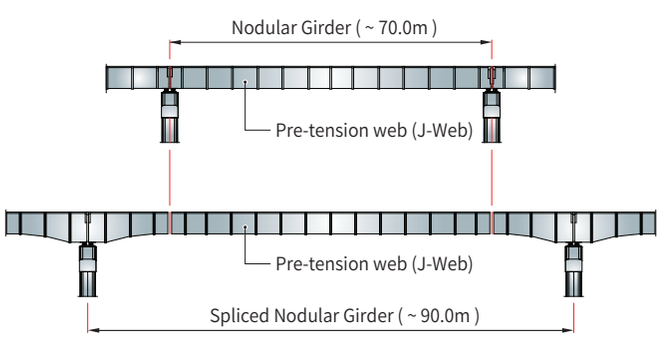
NET No. 812 / S.Korean Patent 10-1405025

Overview

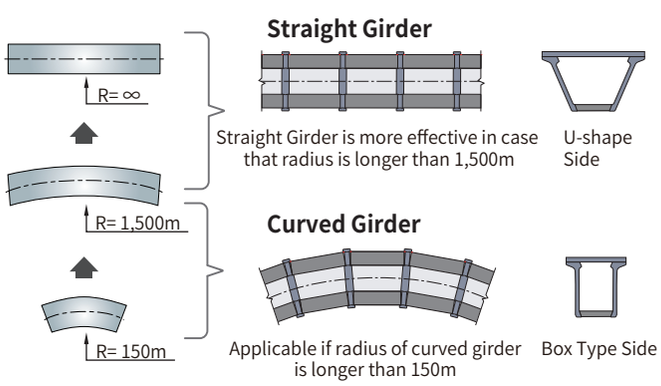
Nodular Girder Technology is a New type of Bridge Construction Method, which is targeted the process separation that production at the factory and assembly & construction on the construction site to enhance the product quality and to shorten construction time to break up its stereotype that bridge should be constructed on site.

This innovative construction method has been applying for long span bridge.

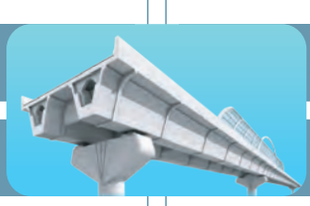
- New Type Bridge - Long Span by realizing slimness of pre-tension web



- Improvements of its structural and physical excellence by applying curved girder to the curved bridge



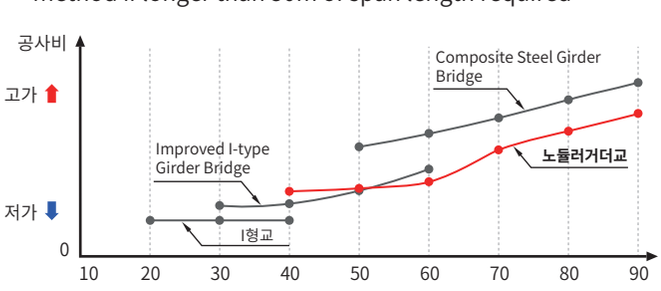
Place where Long Span required



Place where curved Girderbridge required

Place where economic feasibility required

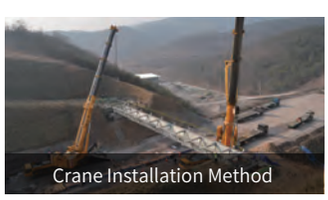
- Nodular girder bridge would be the most economic method if longer than 50m of span length required



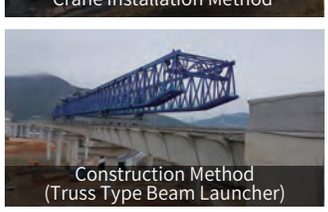
20m ~ 50m	50m ~ 65m	65m ~ 90m
If Curved Girder required	If economic feasibility required	If long span required

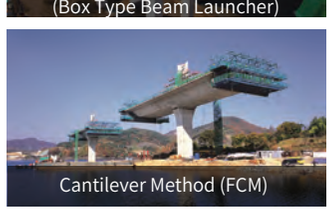
Place where quick construction required

- The bridge type which can be assembled even at difficult locations such as rivers and valleys


Crane Installation Method


Installation Method (Box Type Beam Launcher)


Construction Method (Truss Type Beam Launcher)

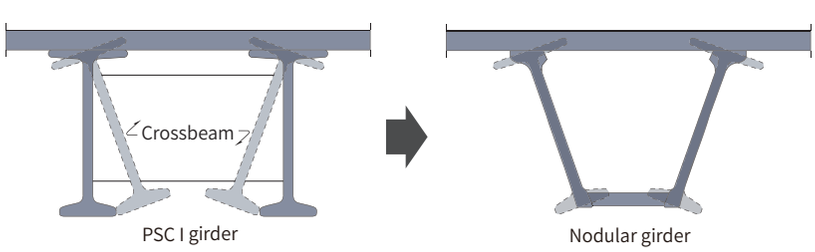

Cantilever Method (FCM)

San-oe bridge(Highway between Milyang and Ulsan, Lot 1

1 Basic concepts

Overcoming the limits of I-shaped sides

• Overcoming weak horizontal hardness of Long Span I-shaped Girder with Box-shaped sides

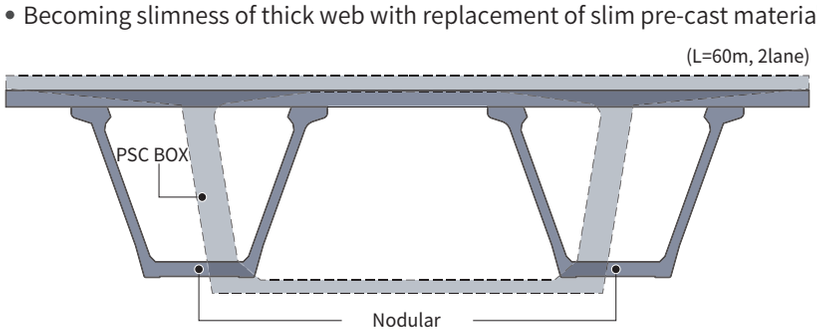


Side Hardness Improvement → **Stable Long Span**

Decrease in numbers of Girder → **Improvements in Stability and Construct ability**

Slimness of Box type side

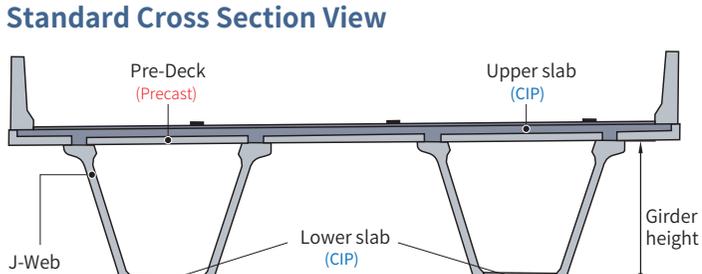
• Becoming slimness of thick web with replacement of slim pre-cast materials



Slimmer Girder Side → **Decrease by 25% of Fixed Load**

Concrete with high intensity(60MPa) → **Durability Improvements**

Standard Cross Section View

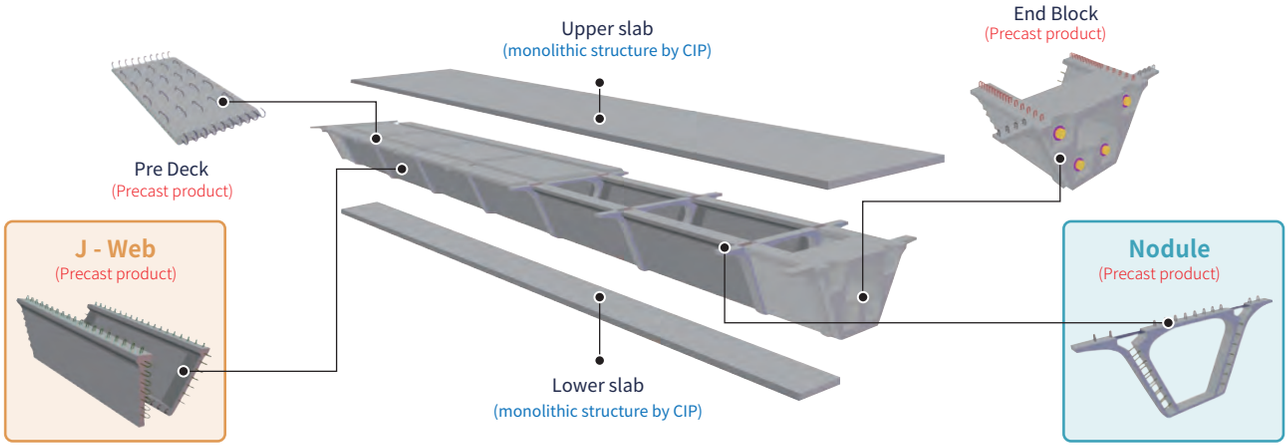


Specification

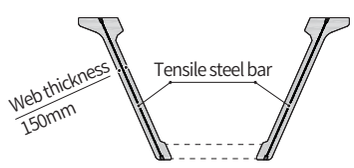
Category	35m	40m	45m	50m	55m	60m	65m	70m
depth(m)	2.0	2.0	2.0	2.2	2.4	2.6	2.8	3.2
weight (ton)	150	165	180	215	255	295	340	395

※ Girder depth is standard depth of long span and possible to be adjusted if necessary With the tender order and sequencing method, girder depth could be optimized

2 Structural highlights



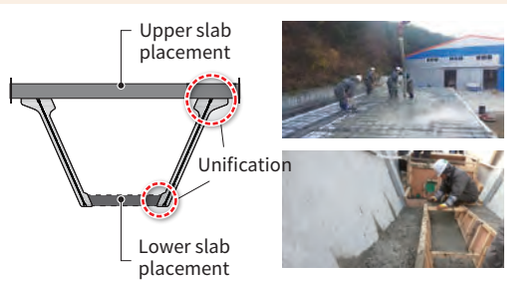
J - Web Web slimming using pre-tension



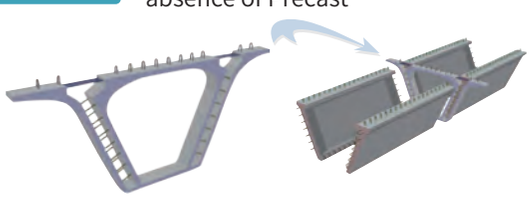
High-lever factory manufacture of precast parts
↓
Uniform high quality

- Slim down underpart to 150mm ➡ **Reduces fixed loads**
- Tensile steel bar application ➡ **Improvement of shear performance**

Unification with J-Web by placing upper & lower slab

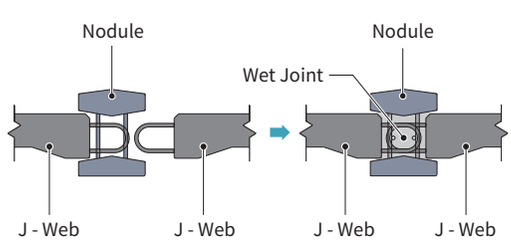


Nodule Connection & Reinforcement due to the absence of Precast



- Precast member connection ➡ **Strengthening section**
- Formworks for J-web connections ➡ **Wet Joint**

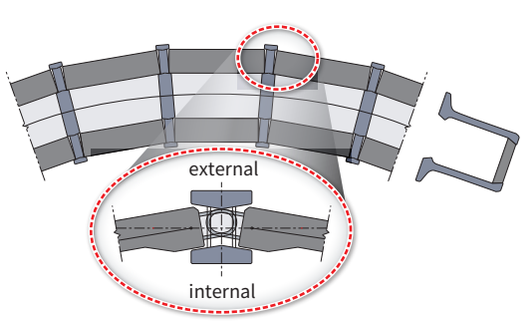
Unification between J-Webs using Wet Joint



3 Design highlights

Curved bridges

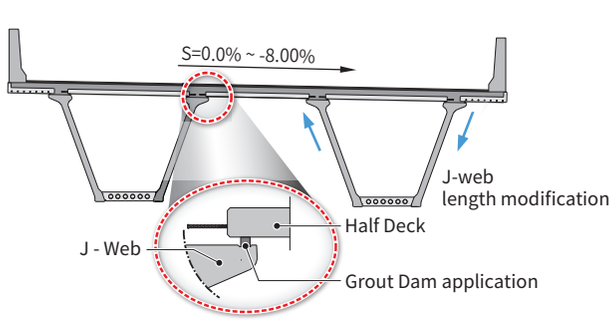
- Nodular design allows easier adaption to curved arrangements



Use diversion of J-Web & Nodule ➡ **Capable of manufacturing curved-girder**

Cross-sectional slopes

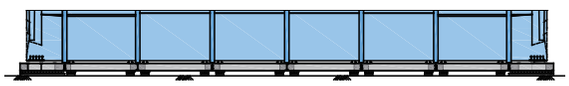
- Can be customized for various cross sectional slopes



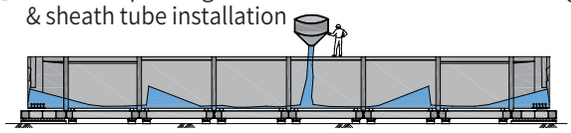
Use of J-Web length modification & Grout dam ➡ **Capable of cross-fall consideration**

4 Assembly highlights

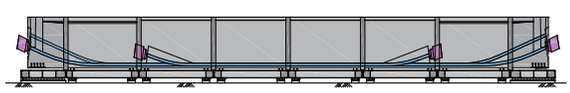
1 Assembling of Precast Members after installation of bed system (J – Web, Nodule, End Block : Precast)



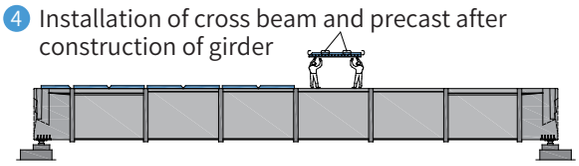
2 Concrete pouring after lower slab rebar assembling & sheath tube installation



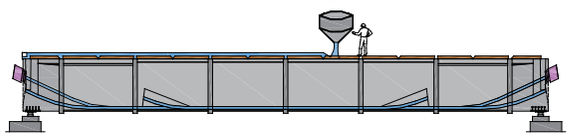
3 Lower slab curing & prestressing strand tension



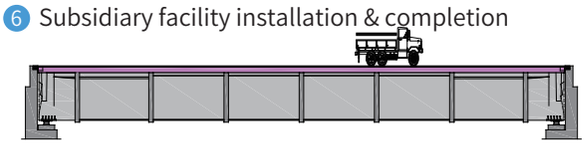
4 Installation of cross beam and precast after construction of girder



5 Upper slab concrete pouring & curing



6 Subsidiary facility installation & completion



5 Construction overview

Manufacturing Precast at Factory

High quality fabricating components are manufactured from exclusive factory and by experts

Delivery and assembling of girder on the site

Fabricating components are transported to construction site to be assembled and place as lower slab to be unified with girder

Construction of Superstructure

Minimize workload by assembling the fabricating components on site & using temporary facility

6 Installation highlights

Sanoe Bridge	• 1st class bridge of highway mainline (Milyang~Ulsan Lot 1) • Extension: L=981m(Max.60m) • Breadth: 12.3m~25.4m • Horizontal alignment: R=2,000~5,000m(S curve) • Curved bridge across river including the highway (Daegu~Busan)	**Gwangjae IC bridge**	• 1st class bridge of highway mainline (Busan Circular highway) • Length: L=35m • Breadth: 24.3m • Horizontal alignment: R=1,450m • Curved bridge applied with curved girder acrossing connecting road)
Dohwa 4 bridge	• 1st class bridge of highway mainline (Paju~Pocheon Lot 3) • Extension: L=245m(Max.55m) • Breadth: 12.3m • Horizontal alignment: R=3,400m • Curved bridge across river including the local road 375 line	**Pyeongpal pedestrian bridge**	• 1st class bridge of highway(Sangju~Youngdeok) • Length: L=45m • Breadth: 5m • Horizontal alignment: R=∞ (straight bridge) • The first Short span bridge applied on the highway

DR Girder

PSC Girder Bridge with Detensioning & Retensioning System

NET No. 582 / S.Korean Patent 10-0724739

Overview

DR Girder is outstanding new technology for construction of bridge that realizes economical bridge with long span and shallow depth by prestressing in non-composite condition and it has been developed concentrating on constructability and safety by manufacturing of half-depth precast deck and cross beam at factory which simplify unnecessary on-site construction process.

1 Product Highlights

01. Maximize structural efficiency

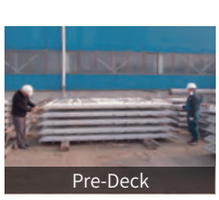
• Introduce tension in non-composite stage

General PSC Type	DR Girder	Content
Construction of site placement slab	2nd seal girder / slab in non-composite stage	10% of efficiency increase by prestressing in non-composite condition

02. Quick & Convenient Construction

• Factory manufacture (Excellent quality control)

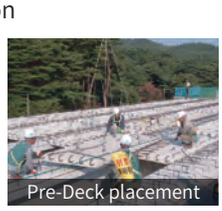

Rebar prefabrication


Pre-Deck


Pre Cast Cross Beam

• Safe construction

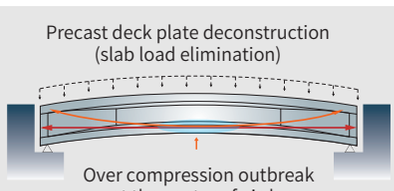

Field arrangement of rebar


Pre-Deck placement

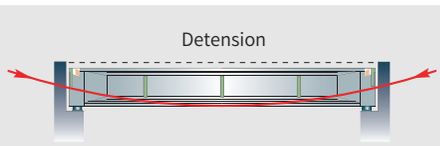

Pre Cast Cross Beam

03. Tension-control system (for O&M)

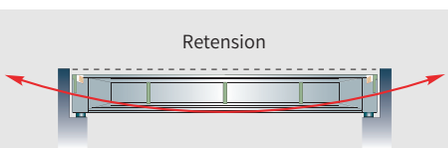
Precast deck plate installation



Detension



Retension

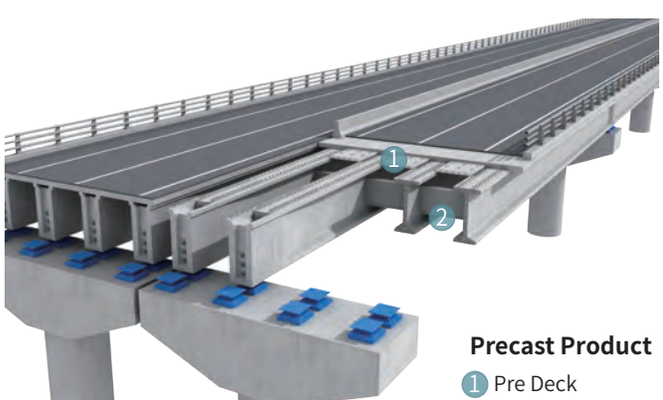


※ Secondary wires are unbounded entirely

• Tension control device

Detension | **Dual-mode** | **Retension**

Seungchon Barrage (Yeongsan River Lot 6)



Precast Product

1. Pre Deck
2. Precast Cross Beam

2 Applicable bridge types

- **Span Length of Bridge** : Max. 55m
- **Alternatives** : ST.BOX, PC BOX, Pre flex Type
- **Site condition**
  : When applying DR Girder construction method at low girder depth (road, river), installation of light weighed temporary girder is required due to the possibility of operation radius restrictions

3 Specification

Category	25m	30m	35m	40m	45m	50m	55m
Depth(m)	0.9	1.1	1.4	1.7	2.0	2.4	2.6
Weight(ton)	39	55	74	95	117	145	178

4 Installation highlights

Category	Project
expressway	Andong JCT bridge on Sangju-Youngduk highway etc.
National expressway	YoungPyeongCheon bridge of road construction work (Jeongok-Youngjung) etc.
Local road & etc	Oksan bridge of road construction work (Cheongju Station Intersection-Oksan Intersection) etc.

5 Installed cases

Incheon New Port, connecting bridge
(2011) L=2@55+2@55=220m

Mari~Songjeong, Geongyejeong bridge
(2010) L=45+2@40+45=170m

Siheung~Namdonggan 2 lot, Namdong bridge
(2008) L=2@40+2@40=160m

Pyeongtaek~Siheung, Sihwa bridge
(2012) L=2,764m

Dr.Spliced Girder

S.Korean Patent 10-1665482

Overview

DR. Girder is a method of on-site assembling by separating a span into 2 or 3 segments to apply existing SPC Girder to a long span. It is recognized as offering outstanding economic value. It is applicable for long-span bridges with a length of 50 ~ 90m, forming beautiful view.

1 Product Highlights

01. Long span Girder

- Max. 90m by PSC Girder
  (overseas case : Moore Heaven교 - 320ft, Route 22 bridge over kentucky river - 325ft, US)

02. Outstanding view

- Variable cross section allows more appealing visuals

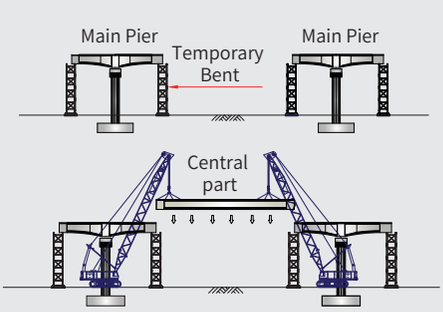
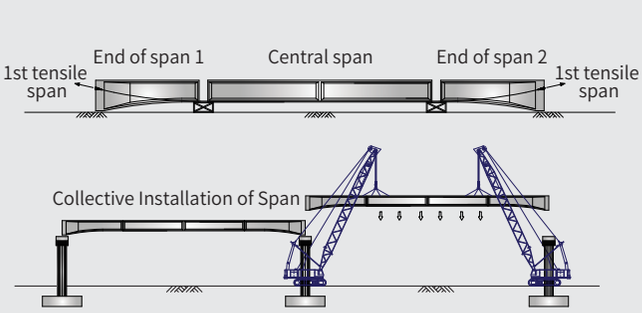
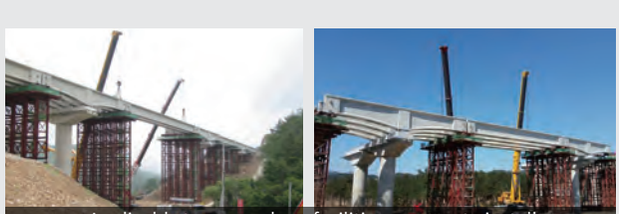
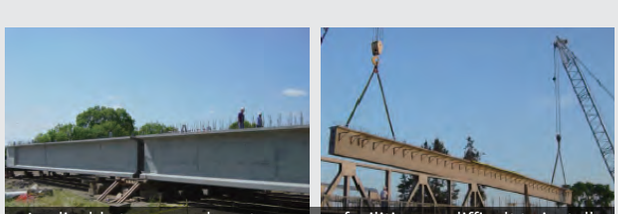
03. Low construction cost

- Up to 20-40% cost savings than other types with the same span

04. Excellence in O&M and Durability

- Minimizes the need for supports and expansion joints

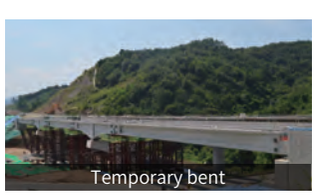
2 Method of Installation

B-Spliced Girder (Connecting bridge deck on temporary Bent)	**G-Spliced Girder** (Connecting bridge deck on the ground)
	
 Applicable to areas where facilities are easy to install	 Applicable to areas where temporary facilities are difficult to install


Maengbang second bridge(Samchuck-Donghae

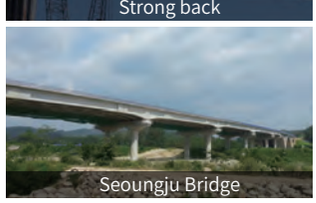
3 Applicable bridge types

- **Span distance** : up to L=90m
- **Type of bridge** : alternative of ST.BOX, PC.BOX
- **Landscape design** : area where externally pleasing appearance
- **Radius of curve** : available planar curve up to R=350

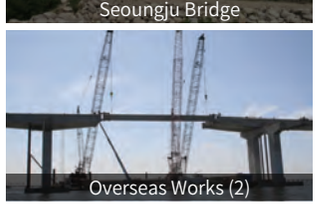

Temporary bent


Strong back


Samtan 1st bridge


Seoungju Bridge


Overseas Works (1)


Overseas Works (2)

4 Economic Efficiency

- Construction cost reduction by 30~40% compared to ST.BOX, PC.BOX
- Construction cost reduction by 20~30% compared to other steel bridge specialized companies

5 Installation highlights

Category	Project	Name of Bridge
Highway	Chungju-Jecheon Lot.3	Samtan 1st bridge
	Samchuck-Donghae Lot.1	Maengbang 2nd bridge
	Jumunjin~Sokcho	Seoraksan bridge
	Hamyang-Ulsan (Lot.28)	Samnam 1st bridge
National road	Chungcheong-Inland	Guancheon bridge
	Improvement works of (formerly)Seoungju bridge	Seoungju bridge


Maengbang 2nd bridge


Seoraksan bridge

Other Construction Method

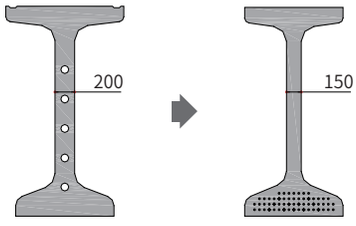
Overview

JANGHEON is diversifying its business with various new product lineups and installation equipment: Its Pretension Girder features variable cross-sections. Dr. Wide Flange Girder enables safe and rapid construction without shoring works and formworks. Jangheon's own Beam Launcher is available for on-site installation, which is capable of installing our precast components over harsh site conditions such as mountain & valley areas, river, sea, city center, over roads, etc.

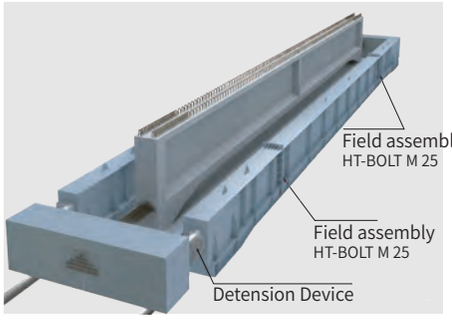
1 Pretension Girder

NET No. 752 / S.Korean Patent 10-1150009

- No need for sheeth pipes
- Smaller section / better value
- Variable section adds visual appeal



01. Application



Movable reaction force deck

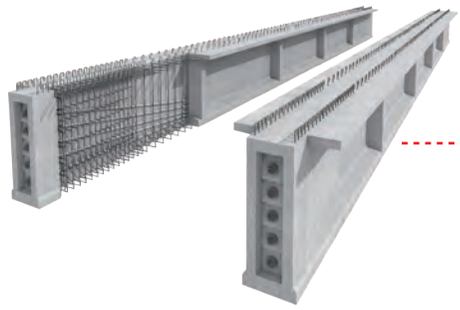
02. Performance

Cheongyang-Honsung 2 lot, Hyohak pedestrian overpass L=25m,
DaeJon Regional Construction and Management Administration

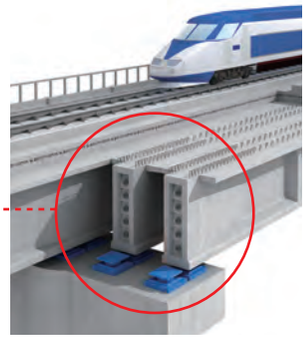
2 Dr. Wide Flange Girder (Railway Bridge)

S.Korean Patent 10-1150009

- No need for in-situ formworks
- Safer and quicker to build



01. Application



Sliced portion of Dr.Wide Flange Girder

02. Performance

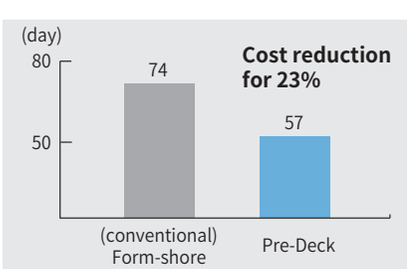
Kyengchun line, Mangu line, Jungwha elevated bridge L=21+2@30=81m, H=2.2m, B=6m


Beam Launcher Construction

3 Pre Deck, Pre Cast Cross Beam

NET No. 852 /S.Korean Patent 10-0788275

- Superior safety
- Minimizes environmental damages
- Easier and cheaper to build



01. Pre Deck

02. Pre Cast Cross Beam

4 Beam Launcher

- 60-70% reduction in installation cost
- Cuts 10-20% down in installation time
- Can be installed in various ways
- Can be installed over challenging site conditions

Category	Project
Highway	Pyeongtaek~Siheung Construction works, Sihwa Grand Bridge etc.
National Road	Seomyeon~Geunnam construction work, Goseong 1 bridge etc.
Feature	**Installation from side and back**

01. Application

02. Performance


Goseong 1 bridge
(Installation from back)


Sihwa bridge
(Installation from side)

PTC

Precast & Pile Tech Corp.

- **HCP Composite pile**
- **GC Rigid Frame**
- **RSW construction method**

Developing Innovative Technologies for Hybrid Composite Piles (HCP) and Precast Concrete Bridges

Precast & Pile Tech Corporation (PTC) was found in 1994 with the company name of Pile Tech Corp. In 2016,, and the company name has been changed to PTC to emphasize the specialty of precast technology.

PTC is a leading company in concrete pile technology covering services of planning, engineering, testing quality control, R&D, and consulting.
Especially It invented Hybrid Composite Piles (HCP), which combined PHC and steel pipe piles into one and has been being contributed to save the national budget.

As with other Hanmac companies, PTC continuously works on technological innovation to provide better precast concrete products and fabrication methods.

To keep pace with the trend adopting Pre-Cast technology in advanced countries, PTC will continue to develop more innovative Pre-Cast Product, Construction Method.

HCP

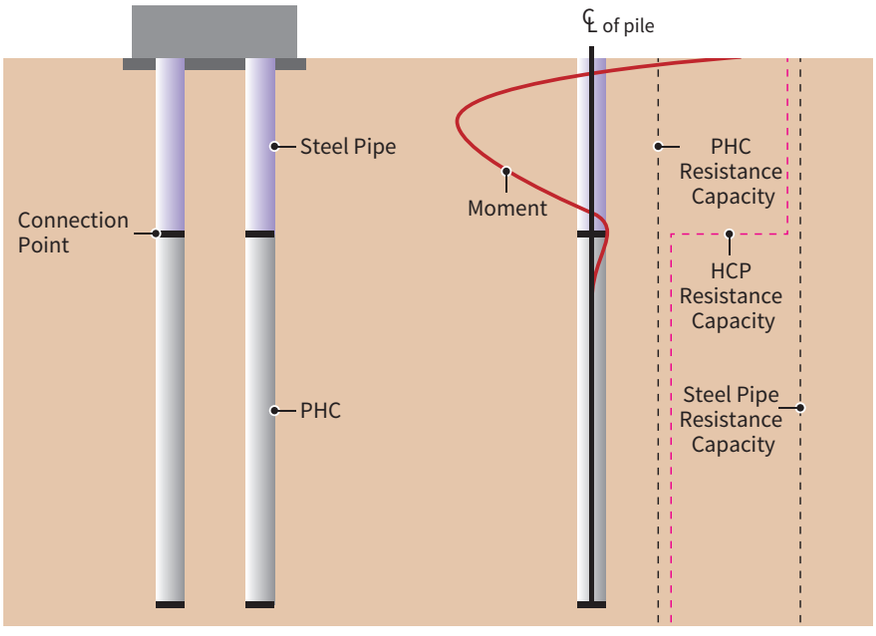
Hybrid Composite Pile

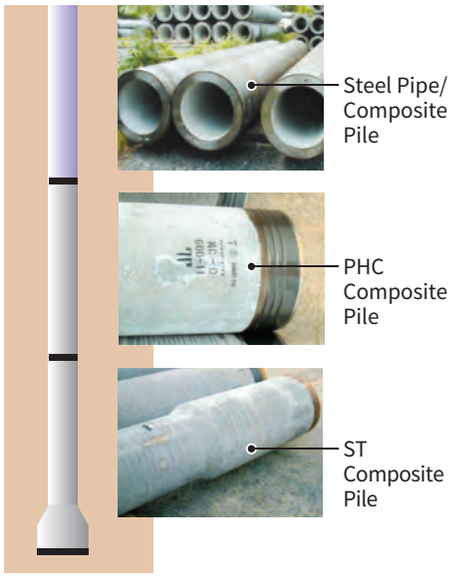
NET No. 556 / S.Korean Patent 10-1942682

Overview

Hybrid Composite Pile, Invented by PTC, provides better safety and value. It consists of two parts: its upper part is made with steel for lateral loads and bending moments while the lower part employs pre-tensioned high-strength concrete technology for bearing axial load.

1 Introduction



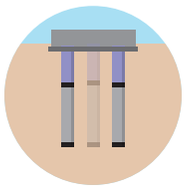


2 Advantages

Cost Efficient

Saves materials

- More economical than steel pipe piles



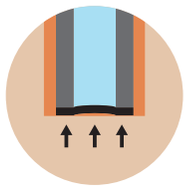
Reduces number of piles

- For lateral-loads-dominant structures

Saves Groutings

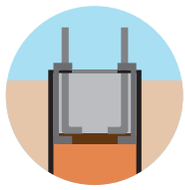
- Bottom-cementing not required
- Minimizes sidewall-cementing

Structural Safety



Easier to have supportive force

- With using closed-type PHC piles



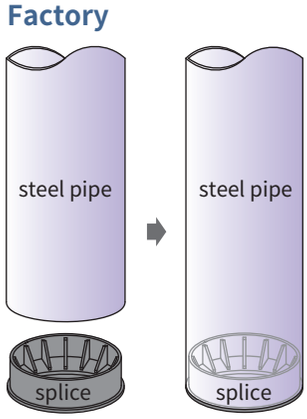
Safer Pile Heads

- Performs well as steel pipes
- Secure connection to foundation

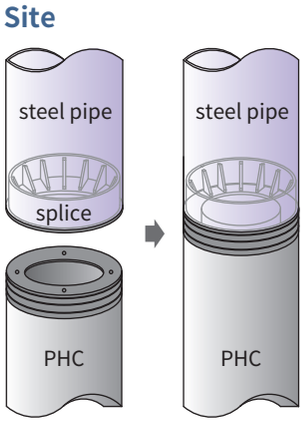
HCP Construction

3 Production

Factory



Site



Assemble Procedure

1. Splice Alignment

2. Splice Welding

3. Pile conveyance

4. Steel Pipe + PHC Connection

5. Completion of manufacture

6. Non-destructive inspection

4 Construction Highlights

Major installations

Category	Project	employer
National Road	Todang~Wondang Road Construction	MOLIT
highway	Jangheung~Gwangyang Construction	EX
Railway	Honam High speed Railway Construction	KR
Public enterprise	Youngjong Haneul-City Development	LH
	Nakjong River Rehabilitation Project zone-20 Construction work	K-Water
	Saemangeum waterproofing construction	KRC
	Goyang Thermal Storage Tank Construction	KDHC
Local gov.	Gamjeon 1-district habitual flooding area maintenance & construction	Busan

Installation photo

GC Rigid Frame

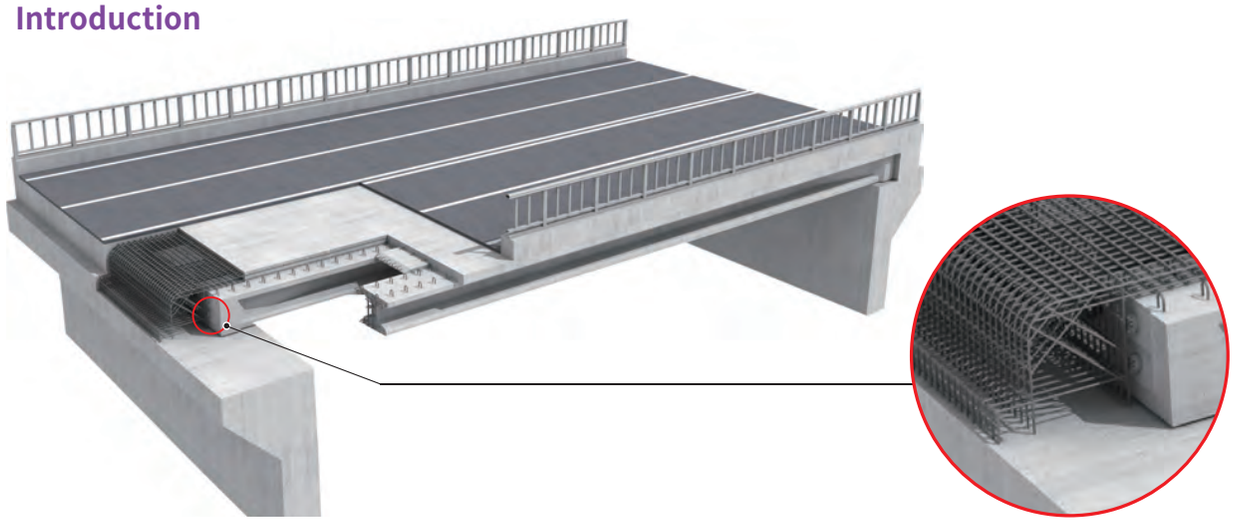
Girder Composite Rigid Frame

S.Korean Patent 10-0946716

Overview

PTC's GC Rigid Frame technology combines the advantages of PSC girders and Rahmen bridges. Like other Rahmen structures, it doesn't require supports and expansion joints, making it better in terms of drivability, maintenance, and durability. Also, its pre-fabrication method allows shortened in-situ construction helping cost savings.

1 Introduction



2 Advantages

Minimal height

- can yield more clearance

Economical

- can build for less, and maintain for less

Easy to build, safe, Excellence in O&M

- without in-situ formworks, it can reduce construction time significantly

Smooth and quiet to drive, easy maintenance

- Easy maintenance due to the lack of bridge supports and expansion joints (part replacement & regular check-up is not required)

Highly applicable

- Highly applicable to difficult-to-maintain structures (such as eco-bridges in remote locations)

Structural advantages

- Rahmen type allows better performance in bending, vibration, earthquake resistance
- lement-level optimization is possible due to its modular construction

Hanam city local outstanding district 1

3 Fabrication, Delivery and Installation

Factory




Site




4 Installation highlights

Major installations

Expressway

- Eonyang~yeongcheon express road construction moryang bridge

Western Suwon – Uiwang
L=31m, B=60m

National Road

- Songchu bypass bridge no.

Reconstruction of Maesung-bridge
L=25m, B=20.9m

Local Road & Etc

- Construction of structure protection at Worldcup-bridge ramp

Reconstruction of Gunryang-bridge no.2
L=70m, B=9.6m

RSW Construction Method

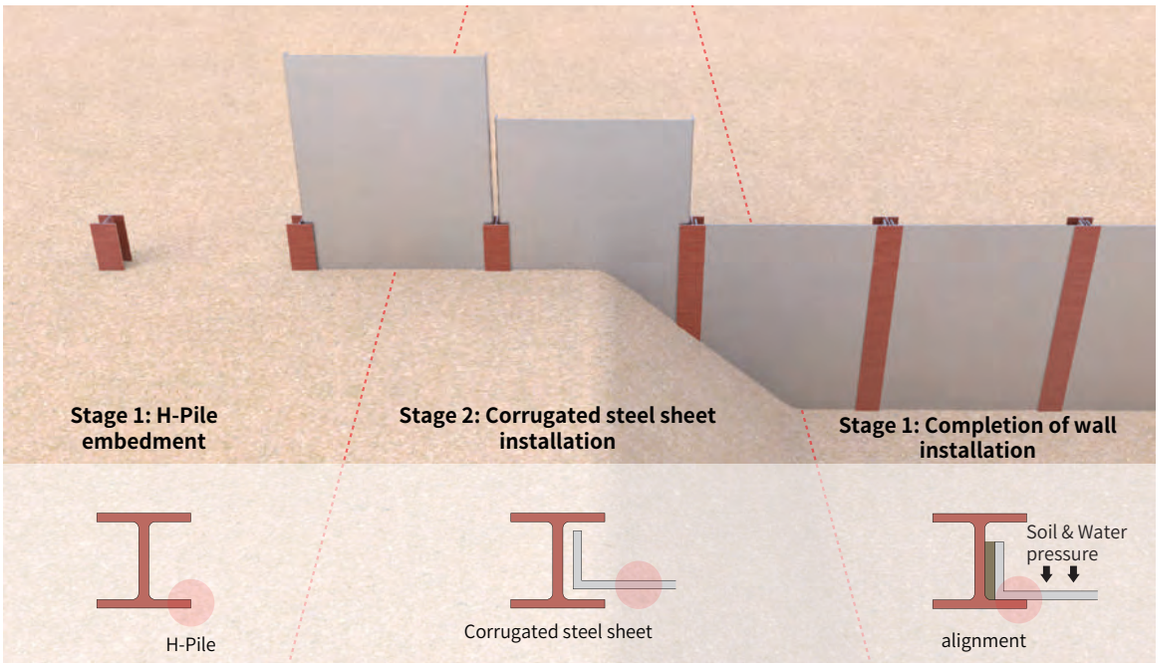
Restrained soil & water
using Sheet Wall type steel plate

S.Korean Patent 10-0882831

Overview

Excellent steel plate construction method to prevent disparity or ground subsidence by drilling or directly hitting H-Pile, installing steel plate using vibro-hammer to form a wall and support.

1 Introduction



2 Advantages

Safe
- better soil and water blocking performance

Easier to install
- simple process
- Better maintenance due to simplicity

Economical
- Requires fewer equipment, shorter time
- Simple process means more savings

Highly applicable
- can be used for constructing conduits, bridge piers, buildings, etc.

With Technology, let's make Human & Nature come together.