

Collection of Construction Technologies

—The World-Class Technologies of Japanese Small and Medium-sized Construction Companies—



JASMOC

Japan Association of Small and Medium-sized enterprises for Overseas Construction



MLIT

Ministry of Land, Infrastructure, Transport and Tourism

On the Publication of the "Collection of Construction Technologies"

The Ministry of Land, Infrastructure, Transport and Tourism is pleased to announce the publication of the "Collection of Construction Technologies", a compilation of the excellent world-class construction technologies possessed by Japan's small and medium-sized construction companies.

The infrastructure of Japan has played a role in supporting the dramatic economic and social development of the country and its subsequent continued growth. The servicing of this infrastructure has been the task of the Japanese construction industry, said to number some 470,000 companies, the majority of those being small and medium-sized construction companies with their roots in their local communities. Two distinctive features of the small and medium-sized construction companies of Japan that can be pointed to are the superior technologies that outperform even the major construction companies, perfected through repeated improvements by each company in its specific field of expertise; and the exacting professionalism they exhibit, deserving of the term 'craftsmanship'. However, due to the constraints imposed by the scale of these companies, networking outside of Japan has been poor, and overseas PR has not been adequate.

At the same time, among these small and medium-sized construction companies there are some, driven by a pioneering spirit and readiness to take on a challenge, that have boldly expanded into overseas infrastructure markets in search of new business opportunities and have already achieved good results. The strengths of this kind of Japanese Construction Company in the global infrastructure market may be summarized largely into the following four points.

1. Contribution to the development of local human resources through the meticulous transfer of technology
2. Consideration of the life cycle cost, such as a high level of durability and efficient maintenance
3. Excellent disaster-prevention technology, developed in natural-disaster-prone Japan
4. Consideration for the environment backed by experience, such as dealing with environmental pollution, energy-saving, etc.

It is our firm belief that the expansion of the activities of small and medium-sized Japanese companies onto the world stage so that they can make the most of these strengths will contribute to economic growth and the improvement of the quality of life of people in countries throughout the world, and we consider it to be in accordance with the spirit of the SDGs.

This "Collection of Construction Technologies" puts the focus on small and medium-sized companies that in spite of their high technical capabilities are not well-known outside Japan, with the aim of introducing to a wide audience both at home and abroad the strengths of each company in terms of its specific construction technologies. These are technologies that have been perfected through repeated improvements in each and every specific area of expertise, and cover many different fields.

Should you be interested in any of the technologies presented in this compilation, do by all means contact the company in question. We are sure that you will be able to find technology to deal with the specific circumstances of each country, region or project, or technology that will be of use in solving the problems you face.

Nakami Taishi
Senior Director, International Markets Division,
Real Estate and Construction Economy Bureau,
Ministry of Land, Infrastructure, Transport and Tourism




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Company	SAITAGUMI Co., Ltd.	Establishment	January 1923
Employees	42	Website	http://www.saita-hd.co.jp
Address	1-2-30 Hikarigaoka, Hakata District, Fukuoka City, Fukuoka 812-0874, Japan		
Contact	Name: Tadashi KAKOO	Construction	Title: Division Director
	Tel: +81-9-4622-3878	E-mail: kensetsu-amagi@saita-hd.co.jp	
Overseas Branches	Phnom Penh Office, Kingdom of Cambodia		
Possible Implementation Areas	Cambodia		
Supported Languages	English, Khmer		

Business Overview

Our company is a general construction company which mainly does business activities in Fukuoka Prefecture, and is one company in the SAITA HOLDING Group.

Main Business: Civil, Building Works, Water and Sewage Works, Paving Works, Landscaping Works

Main Clients: Ministry of Land, Infrastructure, Transport and Tourism, Water Resources Agency, Fukuoka Prefecture, Fukuoka City, Local Government

Achievements in Japan and Overseas

1993 Mar : Indus Highway Section XI 77 km (ODA Loan) in Islamic Republic of Pakistan

1994 Apr : Indus Highway Section I 59 km (ODA Loan) in Islamic Republic of Pakistan

2003 May : Access Road and Plant Yard in Islamic Republic of Afghanistan

2008 Sep : Branch Saita Cambodia Founded in Kingdom of Cambodia

2014 Mar : Sihanouk Province Referral Hospital (ODA Grant Aid) Matsuyama JV in Kingdom of Cambodia

2019 Feb : Bridges (Five) in Package I North Section on National Road No. 5 sub-contracted from Tekken, Taiyu JV in Kingdom of Cambodia

2019 Dec : Assembly Hall and Student Dormitory for Teacher Education Colleges sub-contracted from Sumitomo Mitsui in Kingdom of Cambodia



Overall View by Drone



View of Entrance

Sihanouk Province Referral Hospital Improvement Project in Kingdom of Cambodia

Work System

Branch Saita Cambodia was founded with the Phnom Penh Office, where there is one General Manager (Japanese) and 5 staff consisting of a structural engineer, mechanical engineer, electrical engineer and two office workers. The staff can use Khmer, English and Japanese, are forming close relationships with the local community and are making efforts to facilitate regional development.

General Construction in Cambodia

Please ask about anything we might be able to help you with in Cambodia



2019 Feb.: Bridges in North Section Package I on National Road No. 5 Improvement Project, Sub-contractor from Tekken, Taiyu JV in Kingdom of Cambodia



2019 Feb.: Bridges in North Section Package I on National Road No. 5 Improvement Project, Sub-contractor from Tekken, Taiyu JV in Kingdom of Cambodia

Field	General Construction Industry, Geological Survey, Topographic Survey	Category	Construction
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Technical Overview

[Features of Organization (Saita Cambodia)]

- We are organized to reduce the number of Japanese engineers to the lowest possible level and employ Cambodian engineers, achieving not only high cost performance, but also creating the opportunity to transfer technology to them and develop human resources through experience.
- Our staff are very familiar with Cambodia, have more experience in construction work in this country, can use English, Cambodian, and Japanese, gain experience by training foremen and workers, and in turn are helping in the development of Cambodia.
- Our staff has an intimate knowledge of general construction, can organize construction work, building work, civil work, water and sewage system work, pavement work, and we have a concrete batching plant and agitator trucks which enable us to supply fresh concrete.
- Our staff has experience in topographic surveys and geological surveys, and can deal with this work.

Conditions for Using Technology

Please contact us as we will reply individually to your inquiry.

Company	MATSUYAMA CONSTRUCTION Co., Ltd.		Establishment	1956
Employees	68		Website	http://www.matsuyama-k.co.jp/
Address	2-24-23 Takasago, Chuo District, Fukuoka City, Fukuoka, Japan			
Contact	Name: Mitsuru TSUDA		Title: Director	
	Tel: +81-92-533-0001		E-mail: fukuoka-eigyoubu@matsuyama-k.co.jp	
Overseas Branch		None		
Possible Implementation Areas		Cambodia, South East Asia		
Supported Languages		English		

Business Overview

We are a construction company which focuses on the business activities described below. Our main clients are the Ministry of Land, Infrastructure, Transportation and Tourism, NEXCO, local governments and electrical power companies.

- Civil Works, Building Work, Design and Construction
- Water and Sewage Water System Work
- Port Civil Work, Dredging Work
- Road Pavement Work
- Landscape Work

Other ODA Grant Aid, Accepting Trainees from Myanmar

Achievements in Japan and Overseas

Project: Sihanouk Province Referral Hospital Project in the Kingdom of Cambodia
(Total Area: 5,185 m²)

Client: Ministry of Health of Kingdom of Cambodia

Consultant: The Consortium of Azusa Sekkei Co., Ltd and INTEM Consulting Inc JV

Constructed by "Saita, Matsuyama JV" (2016 Feb.)



Overall View of Hospital



Administration Building

Work System

Project Manager: One Japanese person

Construction Engineering: One Japanese person, one Cambodian person

Deputy Manager: Four Japanese persons (Architecture, Electrical, Mechanical and Plumbing)

CAD Operator: Six Cambodian persons

Site Engineer: One Japanese person, four Cambodian persons

Safety Control: One Cambodian person

Total: 19 persons

Cambodia Building Work Centered on Quality

High Technique of Hospital Construction



Construction of the medical and surgical wards

Scope of Work

- ER, Imagery and Operation Building: 1,080 m²
 - Administration Building (2 story): 1,071 m²
 - OB/GY and Pediatric Ward Building: 1,305 m²
 - General Medicine and Surgery Ward Building: 945 m²
 - Service Building: 190 m²
 - Elevated Water Tank/Connecting Corridor: 594 m²
- Total Area: 5,185 m²

Field	General Building Works (Include External Works)	Category	Building Work (Including Mechanical & Electrical Works)
Registration, Awards	2017: Received Letter of Appreciation from Japanese Association in Cambodia		

Technical Overview

[Technical Features]

Our company takes the experience of techniques in Japan applies them in Cambodia to projects like the Sihanouk Province Referral Hospital Improvement Project. In Sihanouk Province, the Province Referral Hospital is a high level public hospital, and we are incorporating the quality needed in this improvement project to provide medical services by constructing a new facility and installing new medical equipment.

- We are directly implementing this project by ourselves. Under the supervision of a Japanese engineer, we employ local engineers to make it easier to prepare the construction equipment and tools ourselves, and can also manage and control electrical work, mechanical work and medical gas system work.
- We have assigned a total 19 Japanese engineers and local engineers persons to our construction organization, and take care to train and transfer technology to the local engineers.
- After the referral hospital was constructed, we have noticed that the quality of medical services has improved, enhancing the lives of people living in the province by providing a high level service and good health.

[Merits of Adopting Technology]

By organizing a Japanese manager and local engineers in a construction organization, it is possible to prepare the construction equipment and smoothly manage the work, reducing the construction period.

[Contributions to Solving Issues]

Through the implementation of projects, we provide technical instruction to local engineers who gain more knowledge and improve their skills in infrastructure construction in the future.

[Video Link]

<http://www.matsuyama-k.co.jp/>

Conditions for Using Technology

We will reply to you individually, so please contact us.



Company	HASHIMOTOGUMI Corporation		Establishment	1922
Employees	250		Website	www.hashimotogumi.co.jp/
Address	5-9-3 Sakae-cho, Yaizu City, Shizuoka, Japan			
Contact	Name: Hideki MIURA	Overseas Preparatory Office		Title: Deputy General Manager
	Tel: +81-3-3810-2351		E-mail: eigyo@hashimotogumi.co.jp	
Overseas Branches		Vietnam (local corporation)		
Possible Implementation Areas		Vietnam and neighboring countries		
Supported Languages		Vietnamese (e-mail), English (e-mail)		

Business Overview

[Offices] Headquarters: Shizuoka, Branches: Tokyo, Chiba, Miyagi

[Lines of Business] Construction, architecture, civil engineering and property services (general construction business), ready-mixed concrete manufacturing and sales (plant manufacturing capacity 195 m³/hrs)

[Turnover] 133 mil USD @105.25 (2019 fiscal year)

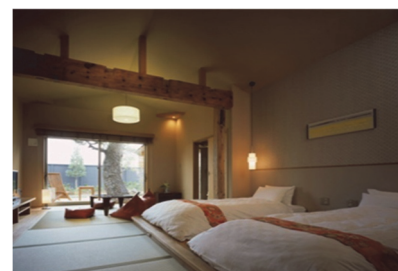
[Classification] Civil Engineering: ports, rivers, roads, land reclamation, water and sewage
Building Construction: food factories, large cold storage warehouses, commercial facilities, accommodation facilities, medical facilities, offices and housing



Ownership of a floating crane barge (280t)



A panoramic view of the YAIZU fisheries port which has facilities we have designed and built.



Typical Japanese style hotel which was designed and built by us.

Achievements in Japan and Overseas

[History] 2017: Hired four Vietnamese engineers

2019: Established Local Company named "HOPE E&C JSC."
(HASHIMOTOGUMI Corporation 35%, Ozawa Civil E&C Co., Ltd. 35%, Local Partner 30%)

[Construction Record]

2019	Vietnam	Design entrustment of Accommodation facility model house [HASHIMOTOGUMI Corporation]
2020	Vietnam	Construction management of Underground structure temporary earth retaining wall [HASHIMOTOGUMI Corporation]
2020	Vietnam	Construction Management of Silo repair work [HOPE E&C JSC.]
2021	China	Basic Design and Supervision work of Food Factory [HASHIMOTOGUMI Corporation] *Under negotiation

Work System

[HASHIMOTOGUMI Corporation]

- Vietnamese Engineers are under OJT and Off-JT in both Vietnam and Japan for construction, design, and estimation.
- One engineer got Second Class Engineer for Civil Engineering
- In 2020, engineer was involved in temporary earth retaining work in Ho Chi Ming City for 3 months.

[HOPE E&C JSC.]

- Two Vietnamese Engineers are under OJT and Off-JT from Japan.

Design and building of factories related to the food industry with Japan quality

Design and building of Food factories, Ultra-low temperature cold storage facilities, and Cleanrooms which are applicable to HACCP



MARUIRI FOOD SUPPLY
Food Factory, ULT Cold storage



YAMAZAKI
Food Factory and R&D Center



Field	Architecture	Category	Design, building, management
Registration, Awards	The 34th Shizuoka Construction Industry Association MONOZUKURI tournament, Prize for Excellence for "Design and Building of MARUIRI FOOD SUPPLY Food Factory ULT Cold storage"		

Technical Overview

[Technical Features]

- We have a long history of surveying, planning, designing, constructing, and maintaining food factories and ultra-low temperature refrigerated warehouses in Japan. In recent years, we have accumulated a lot of know-how, especially in order to achieve HACCP (Hazard Analysis Critical Control Point).
- In the design and construction stages, HASHIMOTOGUMI Corporation is able to take a coordinating role with consultants and electrical and equipment manufacturers to provide optimal solutions to customers.

[Merits of Adopting Technology]

- Providing the same level of manufacturing environment in overseas countries as in Japan by realizing factories and warehouses of Japanese quality in terms of design and build.
- In particular, for Japanese companies that relocate their manufacturing bases overseas, we will relieve anxiety concerning the management of the design and build process during construction.

[Contributions to Solving Issues]

- For Japanese companies planning to move their manufacturing bases overseas, creating environment to facilitate easy expansion of business for companies from the construction point of view.
- Employment creation and ripple effect on economy in related industries by expanding business of companies into Vietnam and neighboring countries.
- Creating opportunities for local construction personnel to acquire specialized construction techniques.

Conditions for Using Technology

- Compliance with local laws and regulations, including construction-related laws and regulations.
- Please feel free to contact us without any hesitation, including with respect to restrictions depending on the surrounding infrastructure (roads, electricity, water, etc.).



Company	HIRAIWA Construction Co., Ltd.		Establishment	1946
Employees	130		Website	https://www.hiraiwa.co.jp/
Address	8-19 Minamisumyoshi, Tokorozawa-Shi, Saitama, 359-1188, Japan			
Contact	Name: Tomomi TAMAKOSHI		Sales Department	Title: Director
	Tel: +81-4-2923-2221		E-mail: tomomi-tamakoshi@hiraiwa.co.jp	
Overseas Branches		Vietnam (Ha Noi, Ho Chi Minh City)		
Possible Implementation Areas		Entire country of Vietnam		
Supported Languages		English, Vietnamese		

Business Overview

[JAPAN]

General construction industry (Building construction, engineering work, water supply facilities)

1. Specialized construction (Black kite, earth work, concrete construction)
2. Renewal construction
3. Earthquake-resistant repair work
4. Real estate transactions

[VIETNAM]

1. Design, construction and repair of factories and warehouses
2. Offices / store interiors
3. Support for selecting industrial parks
4. Application support for various licenses (ex: ERC, IRC, EIA)

Achievements in Japan and Overseas

[The construction results in Vietnam]

Hai Phong City: Nomura-Haiphong-IZ Metal parts assembly plant enlargement construction (completed in May 2020)



Hung Yen Province: Thang Long2-IP Ceramic parts manufacturing factory interior construction (completed in June 2020)



Work System (in Vietnam)

- Resident management by Japanese engineer * Patrol management of rental factory
- Submit weekly progress reports with photos in Japanese

Realizing Japan quality factories at a low price

Vietnam: Support everything from land selection, design and construction, to follow up



We offer construction with resident management by a Japanese engineer

Field	Construction	Category	Construction method
Registration, Awards	We construct Japan quality at a low cost. As advance support of the company in Japan, we support various procedures, starting with the choice of land.		

Technical Overview

[Vietnam Construction System]

① Japanese engineer

Experienced Japanese engineer resides locally and performs construction management at Japan level quality.

② Follow-up service

Japanese engineer will immediately respond to initial defects. We also carry out 1 year and 2 year inspections.

③ Japanese communication

All on-site meetings will be conducted in Japanese, and customer requests will be reflected in the construction work.

④ Report written in Japanese

Materials to be submitted to the customer and the head office in Japan will also be submitted in Japanese.

⑤ Fixed point camera

We install a fixed point camera and allow you to confirm construction progress from Japan.

⑥ Support for Japan HQ

Vietnam and Japan HQ will work together to proceed with the construction. We dispatch a Japanese engineer regularly and give tests at the company.

[Video Link]

<https://www.hiraiwa.co.jp/works/>

<https://www.facebook.com/vietnam.hiraiwa.5>

About Hiraiwa Vietnam

Hiraiwa Vietnam is a wholly owned subsidiary of Hiraiwa Corporation, which was established 74 years ago and is headquartered in Tokorozawa City, Saitama Prefecture. We have bases in Ho Chi Minh City and Hanoi, and provide Japanese quality construction by Japanese engineers at a low cost. Please feel free to contact us for anything from selecting an industrial park to supporting your business expansion.

Company	Sakai Heavy Industries Ltd.	Establishment	May 1918
Employees	290	Website	http://www.sakainet.co.jp
Address	4-8 Shibadaimon 1-Chome, Minato-ku, Tokyo, 105-0012, Japan		
Contact	Name: Hitoshi FUJITA	Engineering Sales Division	Title: General Manager
	Tel:+81-3-3431-9971	E-mail: skw.en.inquiry@sakainet.co.jp	
Overseas Branches		Indonesia, China, USA, Thailand	
Possible Implementation Areas		Asia, Africa, North and South America, Middle East	
Supported Languages		English	

Business Overview

Manufacture and sales of construction equipment and industrial machinery, and sales of outsourced industrial machinery. Our main products are described below.

[Compaction equipment]

- Vibratory Single Drum Rollers, Vibratory Tandem Rollers, Static Pneumatic Tire Rollers, Static Three Wheel Rollers, Vibratory Pneumatic Tire Rollers, Rammers, Compactors and Walk Behind Rollers

[Road maintenance and repair equipment]

- Road Planers, Road Stabilizers, Asphalt Pavers, Road Cleaners and Water Sprinklers

Achievements in Japan and Overseas

In 1929, SAKAI developed the first Road Roller made in Japan. Since then, SAKAI has supplied many kinds of road rollers to more than 140 countries through our distributors as pioneer of road construction equipment. SAKAI has developed a vibratory pneumatic tire roller that is a one of a kind technology in the world. Furthermore SAKAI is engaged in the technical transfer of the stabilizer construction method to contribute road development in Asian and African countries through ODA projects.

Asia



Middle East



Oceania



South America



Vibratory Pneumatic Tire Roller

SAKAI Roller working in the world

Work System

The SAKAI global service division is in charge of providing training for machine operation and maintenance in cooperation with distributors, technical transfer of the stabilizer construction method, and the dispatch of Japanese technical engineers to countries to introduce material composition design and construction methods. SAKAI produces equipment in Indonesia, China, and the U.S.A where it trains local staff and local workers.

Stabilizer Construction Method

Road paving technology that enables the construction of low cost and durable pavement using existing road materials



Stabilizer



Training for technical transfer

Field	Road pavement construction	Category	Construction Method, Equipment
Registration, Awards	1st Japan Construction International Award (MLIT)		

Technical Overview

[Technical Features]

- Construction of strong and long life pavement using a stabilizer that crushes the damaged existing road surface and mixes existing materials with a cement and asphalt emulsion.
- This method is low cost and saves materials because the existing materials are recycled.
- This method can be used widely to improve soil roads, gravel roads and damaged asphalt pavement.

[Merits of Adopting Technology]

- Time saving: The stabilizer crushes and mixes existing materials on-site, reducing the time required.
- Reduction of risk of material procurement and construction cost: This method reuses existing materials.
- Reduction of life cycle cost: This method strengthens the structural performance and makes the pavement durable.

[Contributions to Solving Issues]

- In many countries the volume of traffic volume is increasing more rapidly than roads are expanded. There is concern that the traffic volume will continue to increase, resulting in increased damage to roads. The biggest problem is using budgets effectively for maintenance and new construction. This method facilitates effective road infrastructure development by reducing maintenance costs.
- After the technical transfer, introduced country can construct roads itself.
- Quick recovery from natural disasters like earthquakes is possible because of minimum material procurement.

[Video Link]

100 year anniversary video: <https://www.youtube.com/watch?v=JivSOUyzvII&feature=youtu.be>

Conditions for Using Technology

- Securing of passable road for stabilizer.
- Cement and other additives are available.



Company	TAIYU KENSETSU CO., LTD	Establishment	1928
Employees	415	Website	http://www.taiyu.jp/
Address	5-14-2 Kanayama, Naka-ku, Nagoya, Japan		
Contact	Name: Asako Nakamura	Global Business	
	Tel: +81-52-881-1607	E-mail: global@taiyu.co.jp	
Overseas Branches		Vietnam (Ha Noi)	
Possible Implementation Areas		Asian countries	
Supported Languages		English (e-mail only)	

Business Overview

1. Construction industry

2. Manufacturing and selling materials for pavement

Our main business in Japan is road construction with a focus on pavement. Additionally, we produce and sell materials for pavement. Our main business in foreign countries is the sales of materials for pavement that we have developed ourselves. Furthermore, we are doing our best to establish a trustworthy relationship with the local governments, universities, research organizations, and private companies in these countries. Our lineup of materials for pavement consist of Asphalt modifier (TPS) for porous asphalt pavement, Anti-rutting asphalt modifier (TPP), anti-stripping agent (TFH), cement-milk modifier (STP) for semi-flexible pavement, and others. We are eager to proceed with the sales of our materials through technical support to foreign governments or companies. In Vietnam, we established "TAIYU VIETNAM CO., LTD." as a sales base of our materials in February, 2018. For other countries, we are selling our products through local agencies or technical cooperation companies.

Achievements in Japan and Overseas

1. TPS sales results (as of Nov. 2020)

South Korea: Namhae Expressway (2001) etc., equivalent to 2,200,000 m²

China: Shaanxi Airport Expressway (2003) etc., equivalent to 3,380,000 m²

Vietnam: Phap Van – Cau Gie Expressway (2018), equivalent to 610,000 m²

Others: Taiwan, Thailand, Kazakhstan, Indonesia, Malaysia, equivalent to 150,000 m²

2. Anti-stripping material (TFH: Tough Fix Hyper)

Used 830,000 tons of Asphalt mixture in Vietnam

3. Others: Expect to expand sales of semi-flexible pavement modifier material (STP) in the future. Sales activities for Anti-rutting asphalt modifier (TPP) being conducted in Vietnam and the Philippines.

4. 1st Japan Construction International Award (MLIT) SMEs category



Vietnam: Cau Gie – Ninh Binh Expressway (test construction, 2014)



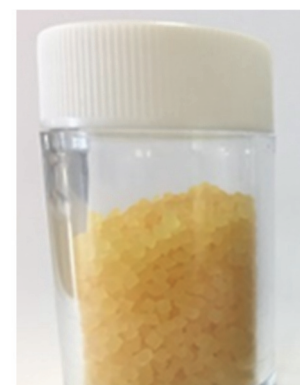
China: Shaanxi Airport II Expressway (2009)

Work System

Engineers are dispatched from Japan for construction supervision if needed. Regarding TPS, a consortium for sales has been formed with local companies in Vietnam. In China and South Korea, TPS is being sold by local distributors or technical cooperation companies in conjunction with technical instructions we provide at construction sites. Intensive lectures on our advanced technologies are being regularly given at universities in Vietnam.

Porous asphalt pavement using asphalt modifier material "TPS"

Asphalt modifier material "TPS" can be used to construct high-performance porous asphalt pavement anytime, anywhere



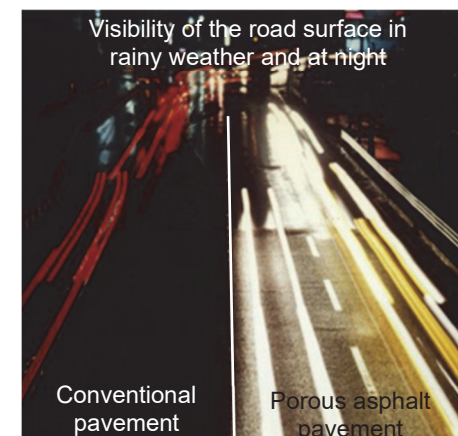
Asphalt modifier material for porous asphalt pavement -TPS



Construction situation



Construction situation



Conventional pavement

Porous asphalt pavement

Field	Pavement	Category	Materials
Registration, Awards	License no: ZL200410043134.8 (China), 109599 (Singapore), HK1075905 (Taiwan) Decision No. 431/QD-BGTVT (Vietnam, 04 February 2016)		

Technical Overview

[Technical Features]

- Porous asphalt pavement not only has distinguished performance such as noise reduction and high durability, but also significantly improves the visibility of road surface on rainy days and at nights, and it contributes to traffic safety and driving comfort.
- The core of porous asphalt pavement uses highly modified asphalt. However, highly modified asphalt has the problem with quality deterioration during storage, making it difficult to export this material to foreign countries.
- When TPS is used, since there is no problem with quality deterioration, TPS can be exported and used anywhere.
- Based on our long-term experiences, we can provide any country with technical guidance on porous asphalt pavement in order to meet conditions in the country such as the asphalt plants, aggregates used, paving system, etc.

[Merits of Adopting Technology]

- The only task that needs to be done at the asphalt plant is to put TPS into the asphalt mixer. Special equipment is not required. (For big projects, an automatic weighing & adding equipment is provided.)
- Straight asphalt 60/80 is used as the base asphalt. TPS comprising 12% of the total asphalt is put into the mixer. Therefore, a normal asphalt mixture can be also produced in parallel with the porous asphalt mixture.
- We would be happy to provide users with technical support on material selection, mix design, etc.

[Contributions to Solving Issues]

- This technology reduces the adverse effects on economic activities such as logistics due to the rainy season and squalls. It helps to reduce traffic jams and slow driving speeds due to water splashing and the reflection of lights that occur when it rains.
- It has superior rutting resistance, crack resistance, and scattering resistance of aggregates, drainage function, and low noise function, so it is excellent for safety, the environment, and economy compared to conventional asphalt pavement.

[Video Link]

<https://youtu.be/cbGja-IMlrA> <https://youtu.be/7JmpwG8IYho>

Conditions for Using Technology

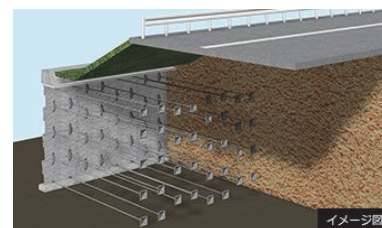
- Porous asphalt is preferable for expressways, national roads and elevated roads where there is low risk of the air voids being clogged. When porous asphalt is used on streets in cities, adequate discussions should be held on dealing with intersections.
- Even when there is concern for possible stripping by aggregates such as granite, the use of the anti-stripping agent "TFH" together with TPS eliminates the problem of stripping.

Company	OKASAN LIVIC CO., LTD.	Establishment	1971
Employees	231	Website	https://www.okasanlivic.co.jp/
Address	Nissin Build. 10F, 1-8-27 Kounan, Minato-ku, Tokyo, 108-0075, Japan		
Contact	Name: Satoshi KOBAYASHI	Project Sales Dept.	Title: Deputy Director
	Tel: +81-3-5782-9082	E-mail: kobayashi.satoshi@okasanlivic.co.jp	
Overseas Branches	Vietnam		
Possible Implementation Areas	Vietnam, Myanmar, Philippines, Indonesia		
Supported Languages	English (e-mail only), Vietnamese (e-mail only)		

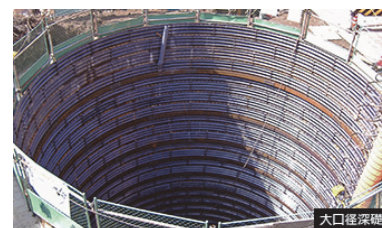
Business Overview

Construction Material Manufacturer and Supplier

- Embankments: Multi-anchored retaining walls, EDO-EPS method, Geogrid (TRIGRID EX), Paralink (High Strength Web-shaped Geosynthetic)
- Steel materials: Liner Plate, Corrugated Pipe
- Maintenance: Pipe Rehabilitation method (ARIS Liner / SW Liner), High durability fences
- Others: Takino Filter, HDPE pipe, Plastic underground water tanks etc.



Multi-anchored retaining wall



Caisson Pile (Liner Plate)

Achievements in Japan and Overseas

1. Overseas Sales

- Products: Geogrid, Paralink, Takino Filter, Liner Plate, Corrugated Pipe
- Countries: Vietnam, Philippines, Pakistan, Nepal, Honduras, Bhutan, China, South Korea

2. Overseas Expansion

2011: Ho Chi Minh City Representative Office founded

2015: OKASAN LIVIC VIETNAM CO.,LTD founded



Geogrid (Nepal)



OKASAN LIVIC VIETNAM CO., LTD.

Work System

Providing Japanese technical advisors for local contractors.

EPS (Expanded Poly-Styrol) Construction Method

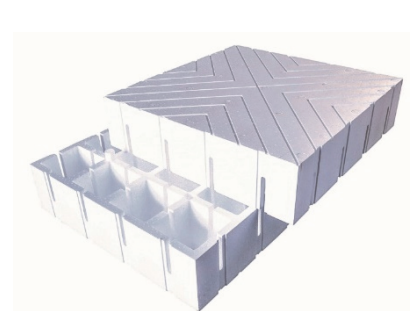
Lightweight embankment method using EPS blocks instead of soil to improve workability



Road embankment (Japan)



Field test (Vietnam)



Buoyancy-resistant block
(Reduces buoyancy by 60%)

Field	Road embankment, Backfilling of structures	Category	Method, Material
Registration, Awards	"EDO-EPS Construction Method Standard" 3rd Revised Edition (2019, Japan) Applying for Vietnamese Standard "TCCS"		

Technical Overview

[Technical Features]

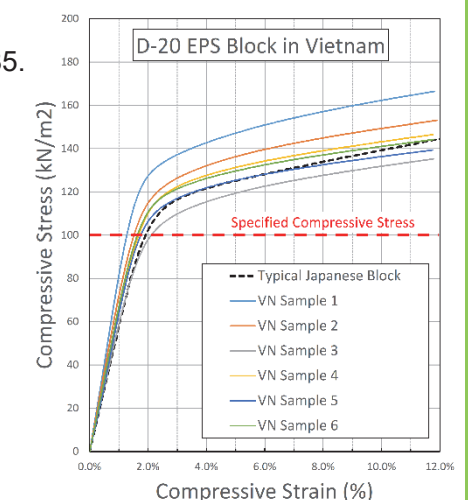
- First construction in Norway in 1972. Introduced in Japan in 1985.
- Unique technologies have been developed since then.
- Japanese quality EPS blocks can be supplied at low cost.

[Merits of Adopting Technology]

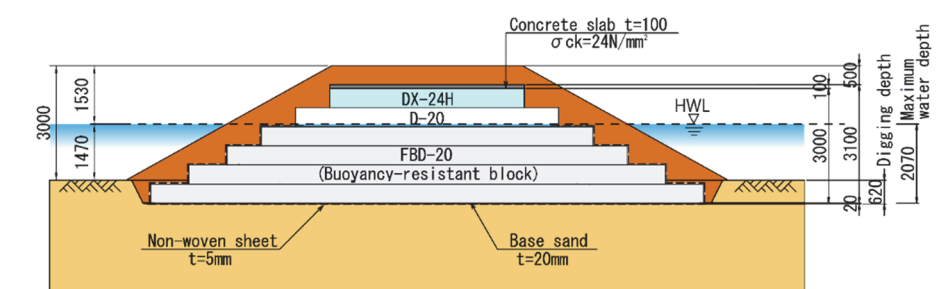
- Easy handling, easy installation without heavy machinery.
- Not restricted by depth and softness of soft layer unlike piles.
- Makes construction less costly and quicker on any ground.

[Contributions to Solving Issues]

- Prevents settlement of embankment on ultra-soft ground.
- Repairs the difference between abutment and approaching road.



Test result of EPS block manufactured in Vietnam



Application example to Mekong Delta

Conditions for Using Technology

- Buoyancy-resistant blocks can be applied in case of high groundwater.
- We can propose the best solution for any site with a track record of over 35 years.

Company	AKROS TRADING CO., LTD.		Establishment	1992
Employees	307		Website	http://www.yk-akros.com/
Address	12th Floor, B Wing, Shiba Park Bldg, 4-1 Shiba-Koen 2-chome, Minato-Ku, Tokyo, Japan			
Contact	Name: Yutaka OHNO		Special Cement Additives Dept.	Title: Sales Manager
	TEL: +81-3-5405-6025		E-mail: ohno-yt@yk-akros.com	
Overseas Branches		Shanghai, Taiwan, Hong Kong, Thailand, Malaysia, Indonesia, Vietnam, India		
Possible Implementation Areas		Shanghai, Taiwan, Hong Kong, Thailand, Malaysia, Indonesia, Vietnam, India		
Supported Languages		English, Indonesian, Korean, Thai, Pekingese		

Business Overview

1. Function: We have been trading in electronic materials, synthetic resin, synthetic rubber, and construction and building materials to Southeast Asian countries as Denka's trading company since we were established and started to operate subsidiary companies in Southeast Asian countries in early 1990.
 2. Features: Indonesian company "PT HISSAN TRADING" has a lot of sales references for quick hardening cement additives used for tunnel work, road and bridge repairing materials, ground improvement materials and special tools for the expanding infrastructure market in Southeast Asian countries.
- One-Stop Service: Product proposal, Export & Import

[Original Technology]

- (1) DENKA NATMIC: Quick hardening cement additives for NATM Tunnels
- (2) Quick Set: Super rapid hardening cement for urgent road repair
- (3) Estopatch RSR: Easy road repair material without using water or electric tools



Achievements in Japan and Overseas

- 2000: NATM tunnel (20 km) for Taiwan High Speed Railway: Supplied DENKA NATMIC
- 2010: Pahang-Selangor Project Malaysia (44 km): Supplied DENKA PF Mortar
- 2012: NATAM tunnel for Pesangan Hydro power plant Indonesia (12 km): Supplied DENKA NATMIC
- 2012-: Indonesia CIKAMPEK Toll Road urgent road repairs: Supplied DENKA QUICKSET
- 2018: Indonesia SURAMADU Bridge road surface repairs: Supplied DENKA Estopatch RSR
- 2020-: NATAM tunnel for ASAHAN 3 Hydro power plant Indonesia (8 km): Supplied DENKA NATMIC



Work System

We don't provide construction work services since we are trading company.

DENKA (ROAD SURFACE REPAIR MATERIAL) ESTOPATCH RSR

Simple road surface repair material, no water or electric mixer required
Can walk on surface in 3 hours after repair, can open to car and forklift traffic in 8 hours



Field	Road Surface Repair (Asphalt, Concrete, Steel Plate)	Category	Material
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Technical Overview

[Technical Features]

ESTOPATCH RSR

- Simple Application: No water or electric mixing required, road surface can be repaired with only a trowel
- Quick opening: Can walk on surface in 3 hours, open to car and forklift traffic in 8 hours
- Excellent durability: Follows the substrate with high adhesion

[Merits of Adopting Technology]

- Small area / thin coating repair: 2 mm to 10 mm (0.93 to 0.19 m²) / set
- Repairs can be made with a small package.
- Because it is packed in a small package, it can be stored at factories, road management companies and construction companies.

[Contributions to Solving Issues]

- By performing road surface repairs just in time, from occurrence → inspection → repair, it is possible to prevent serious deterioration and increases in the damaged area.
- Performing daily maintenance will lead to a reduction in large-scale regular maintenance costs.

[Video Link]

https://www.youtube.com/watch?v=SOOHNE__Ti4

<https://www.youtube.com/watch?v=HlepT0Uy0e4>

Conditions for utilizing technology

- Curing time will be longer than usual at temperatures below 5°C
- If the road surface temperature is 50°C or higher, the pot life will be shorter.
- Although it can adhere to asphalt, concrete, and steel plates, it cannot be installed on roadbeds, foundations, or areas where soil is exposed. (Please remove dust, dirt, and latency in the area before repairing.)
- Solvent-based paint cannot be applied to the repaired area.

Company	Kochi Marutaka Co., Ltd	Establishment	1965
Employees	79	Website	https://www.ko-marutaka.co.jp/
Address	Azono Minami Machi 12-13, Kochi City, Kochi, Japan		
Contact	Name: Osamu YOSHIMOTO	Business management	Title: Executive officer, Director of business management
	Tel: +81-8-8845-1510	E-mail: marutaka@ceres.ocn.ne.jp	
Overseas Branches	Candidate sites: Vietnam, Thailand, Myanmar		
Possible Implementation Areas	Asia, Africa		
Supported Languages	Response by email in Chinese, Indonesian or English		

Business Overview

1. Specialist in foundation & construction (Large diameter rock drilling, retaining walls, preventive piles, bridge foundations, well digging)
2. Bridges (Steel structures and design of construction equipment, structural analysis, production and construction, general civil engineering, machine and equipment installation)

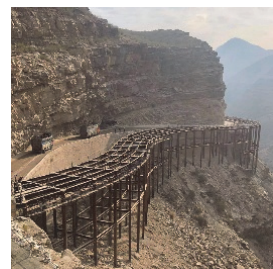
[Original Technology]

- (1) SqC pier method: For piers and gantries that use steel pipes for piles, after we install the upper tunnel made in our factory, we drill the bearing pile (steel pile) and attach the upper panel. The other construction method is to drill the bearing pile (steel pipe) first and then connect a pile head cap to the superstructure via the other pile head cap.
- (2) Long span: The upper bridge is extended by a joint structure. We aim for fast installation and removal, prioritizing construction at the same speed as the bridge. An additional benefit to this is that the pin structure can be reused, which can reduce costs. The use of long girder lengths to reduce the number of bridge piers makes the process more safe and environmentally friendly.
- (3) Sectional self-propelled work barge: This self-propelled structure is equipped with two engines, eliminating the necessity of a tugboat for the pontoon. The weight that can be transported on water is 41 tons. However, this will vary depending on the draft determined by equipment such as a crane, backhoe or heavy machine attachments. The barge can be divided into four components consisting of one trailer and three mid-size trucks for transport on land, and it can be assembled in a short period of time (NETIS: SK-160002-A).

Achievements in Japan and Overseas

2016 to 2019: Pakistan "Pakistan National route N70"
Details of constructed bridge: L 381.0 m / W 8.0 m / 231 steel pipe piles

2016: Uganda "Cable-stayed bridge on the Nile river"
All-turn preceding DH work, casing extraction work
Details of constructed bridge: Pile length 23 m / Diameter of steel pipe pile Φ 630 mm / 27 piles



Pakistan



Uganda

Work System

- In Pakistan and Uganda, technical experts were dispatched to supervise local workers.
- Monastery school will be opened next year in Myanmar. We will develop human resources there as a solution for the shortage of workers in Japan.
- Trained personnel from Myanmar and engineers will be employed to facilitate expansion into third world countries.

SqC Pier Method

This method enables a safe, high quality temporary bridge to be installed even on steep slopes, and quick installation of a temporary gantry



Pakistan Route 70 Repair Work

Field	Bridge construction	Category	Construction Method
Registration, Awards	NETIS: QS-020042-VE Monozukuri Nippon Grand Award: Shikoku Bureau of Economy, Trade and Industry, Received Kochi Invention and Innovation award		

Technical Overview

[Technical Features]

- The SqC pier method provides a pier and gantry that uses steel pipes for the pillar piles, and does not require foundation work. After installing the upper tunnel made in our factory, the bearing pile (steel pile) is drilled and the upper panel is attached first. The other construction method is to drill the bearing pile (steel pipe) first and connect a pile head cap to the superstructure via the other pile head cap.
- Bridge construction, Road construction, Dam construction, Tunnel construction, Disaster recovery, Temporary bridge and Temporary stage, etc.

[Merits of Adopting Technology]

1. Construction period shortened by improving workability: By using steel materials that have been pre-formed in the factory, the construction period can be shortened by reducing on-site assembly work.
2. Improvement of safety and quality assurance: Because the superstructure is built first, work in high places can be reduced, realizing a safe construction site. In addition, quality can be improved by reducing on-site assembly work, for which it is difficult to ensure accuracy.
3. Applicable to wide range: Can be applied to all areas where the bearing piles can be drilled (such as silt, sediment, soft rock and hard rock).

[Contributions to Solving Issues]

The quick restoration of roads and bridges in disaster areas as where landslides often occur has a direct impact on economic activity. This method can help solve problems faster by enabling high-quality temporary bridges to be constructed and which can be temporarily used, even on steep slopes and in highlands.

[Video Link]

<https://www.ko-marutaka.co.jp>

Conditions for Using Technology

Natural condition: None in particular

Site condition: A road is required to carry materials and equipment to the site, a yard is required for the assembly of a crawler crane (this can be on the road). A temporary yard is needed. Regarding the type of soil, it must allow piles to be installed. From past results, the maximum span length is 12.0 m or more (upper panel advance erection method), 16.0 m or more (for pile head cap method)

Company	Koatsu Kogyo Corporation		Establishment	1959
Employees	276		Website	http://www.koatsuind.co.jp
Address	5-17-5 Ishiki, Kagoshima-shi, Kagoshima, Japan			
Contact	Name: Hiroki Sugimoto	Overseas Business Division		Title: Sales Division Manager
	Tel: +81-3-3436-1331		E-mail: infotokyo@koatsuind.co.jp	
Overseas Branches		None		
Possible Implementation Areas		Kyrgyz, Sri Lanka, Indonesia, Vietnam, Haiti, Togo		
Supported Languages		English (e-mail only)		

Business Overview

1. Design and construction of PC bridges and PC tanks, civil engineering work, foundation pile driving, etc.
2. Design, manufacture and sale of concrete products
3. Rental of concrete product molds
4. Manufacture and sale of building materials
5. Design, construction, supervision and contracting for civil engineering and construction works
6. Purchase, sale, rental, exchange and management of real estate and other brokerage business
7. Residential land development and land development business

Achievements in Japan and Overseas

<PC bridge construction subcontracted from major construction company>



Project for Reconstruction of Kok-Art River Bridge on Bishkek-Osh Road in Kyrgyz

Post-tensioned 3-span continuous T-girder bridge
Length: 89 m

Project for Construction of Kara and Koumongou Bridges in Republic of Togo

Kara Bridge Koumongou Bridge
Post-tensioned type Post-tensioned type
Kara Bridge
3-span continuous T-girder bridge, Length 120 m
Koumongou Bridge
4-span continuous T-girder bridge, Length 160 m

Work System

We have a total of about 60 serious, hardworking and enthusiastic engineers in Japan and abroad, including some with experience of working overseas.

The erection equipment is brought from Japan. (We have an excellent performance record in Kyrgyz, Togo and Haiti.)

We accept technical interns in Japan in an endeavor to train engineers.

Total Construction of Prestressed Concrete Bridges

Construction of post-tensioned and pre-tensioned prestressed concrete bridges



Photo-1



Photo-2



Photo-3

Photo-1: Saikoji No.7 Bridge, Length 352 m, PC 4-span continuous rigid frame box girder bridge

Photo-2: Koshiki No.4 Bridge, Length 383 m, PC 4-span continuous box girder bridge

Photo-3: Kozuka Bridge, Length 54.5 m, PC 2-span continuous T-girder bridge

Field	Bridge construction	Category	Construction
Registration, Awards	Certificate of Excellent Construction Performance Company, 2020 Kyushu Regional Development Bureau: Suzaki Bridge, Kagoshima Prefecture Excellent Construction Award 2020		

Technical Overview

[Technical Features]

By prestressing the concrete, the durability and watertightness of the components are improved, resulting in fewer cracks due to load which is concrete's biggest weakness. As well as lower life-cycle costs, reducing the section of the components enables the span to be extended while reducing the weight of the components.

[Merits of Adopting Technology]

- Components can easily be made in any shape and with any section.
- Reducing on-site work by the use of pre-cast components saves manpower and shortens the work period.

[Contributions to Solving Issues]

- Work and costs involved in long-term repairs are reduced by improved life-cycle costs.
- The proportion of equipment, materials and manpower procured in the vicinity of the construction site is increased, thus giving back to the local economy.
- Prestressed concrete technology and bridge construction technology are transferred to local human resources.

[Construction equipment and prestressed concrete manufacturing plants]

Double girder



Cantilever erection



PC slab production



Pre-tensioned girder



Conditions for Using Technology

Consideration of weather conditions or restricted work space may be necessary.

Company	Juntos Co., Ltd	Establishment	1991
Employees	50	Website	http://www.juntos.co.jp
Address	4F 7-2 Hakataeki-Chuogai, Hakata-ku, Fukuoka City, Fukuoka, Japan		
Contact	Name: Takashi KATABUCHI	Administration	Title: Manager
	Tel: +81-9-2412-7053	E-mail: katabuchi@juntos.co.jp	
Overseas Branches	None		
Possible Implementation Areas	Southeast Asia, India, Africa		
Supported Languages	English, Vietnamese		

Business Overview

We are a professional company that consistently designs, constructs and maintains bridges.

1. Bridge planning, Bridge type selection, Detailed design, Construction planning
2. Dynamic & Static Analysis, FEM (Finite Element Method) Analysis
3. Detailed investigation of bridges, Superstructure non-destructive investigation
4. Bridge repair design, Bridge seismic reinforcement design
5. Drawings, Quantity calculation, Checking
6. Concrete bridge superstructure work, Bridge repair work, Construction Management

We design according to the standards of the country, and carry out surveys and construction management work overseas.

Achievements in Japan and Overseas

[Bridge design work results in Japan]

- Superstructure design, Substructure design, Seismic design: Annual average number of bridges handled; 200
- Detailed investigation, Repair design: Annual average number of bridges handled; 200

[Representative Bridge design work in overseas]

[Malaysia] Type: 9 span connecting T girder bridge

- Responsible work: Load bearing capacity check
- Standards: BS
- Language: English

[Myanmar] Type: 9 span connection component bridge

- Responsible work: Superstructure design, Drawings
- Standards: AASHTO LRFD
- Language: English



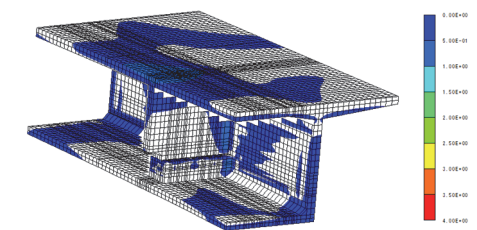
Work System

Experienced construction managers and investigators will be engaged locally upon request.

Please contact us.

Design, Construction and Investigation of Concrete Bridges

We perform design, construction management, and damage investigation for concrete bridges



Field

Bridge construction, Construction management, Bridge design, Bridges

Technical Overview

[Technical Features]

Engineers with a lot of experience in Japan respond in the following fields,

- Concrete bridge superstructure design
- Damage investigation, Repair design, Reinforcement design of existing bridges
- Concrete bridge superstructure construction management

We have the following design software and design in-house,

- TDAPⅢ (Non-linear dynamic analysis of arbitrary structures)
- UC-BRIDGE (Placed girder structural design)
- MIDAS/Civil (Arbitrary bridge design, Seismic design), 50 other bridge design related software packages

[Merits of Adopting Technology]

- Various designs meet the design standards of the country.
- We help shorten the required period because we can handle design and construction all at once.
- Specialized bridge engineers will be engaged locally.

[Contributions to Solving Issues]

- In particular, we can accurately grasp the condition of the existing bridge and propose optimal repair plans and preventive maintenance plans.

Conditions for Using Technology

Steel bridges cannot be designed.

Company	Kawakin Core -Tech Co., Ltd.	Establishment	February 12, 2009
Employees	167	Website	http://www.kawakinco.co.jp/english
Address	2-2-7 Kawaguchi, Kawaguchi, Saitama, Japan		
Contact	Name: Masayoshi OGINO	International Business	Title: Sales Assistant
	Tel: +81 48-259-1117	E-mail: info@kawakinco.co.jp	
Overseas Branches		Vietnam (Hanoi)	
Possible Implementation Areas		Worldwide (Main Area: Asia)	

Business Overview

Kawakin Core-Tech is a top Japanese manufacturer engaged in the development, design, manufacture, and sales of seismic devices (seismic isolation and dampers), as well as structural bearings and expansion joints for bridges and buildings.

Achievements in Japan and Overseas

INTERNATIONAL PROJECTS



Mombasa Southern Bypass & Kipevu New Container Terminal Link Road PK-1
Country : Kenya
Year of completion : 2018
Products : bridge bearings with Al-Mg thermal spraying



New Bridge Across River Nile at Jinja
Country : Uganda
Year of completion : 2017
Bridge type : Cable-stayed
Products : Large-scale bridge bearings and lateral supports



The Kanchpur, Meghna and Gumti 2nd Bridges Construction Project
Country : Bangladesh
Year of completion : 2020
Products : seismic isolators, bridge bearings, expansion joints, and drain basins with Al-Mg thermal spraying

PROJECTS IN JAPAN



Ikema Bridge
Prefecture : Okinawa
Year of completion : 1992
Bridge type : PC continuous box girder
Products : Viscous dampers with Al-Mg thermal spraying



Uminonakamichi Bridge
Prefecture : Fukuoka
Year of completion : 2014
Bridge type : Arch
Products : Bridge bearings with Al-Mg thermal spraying



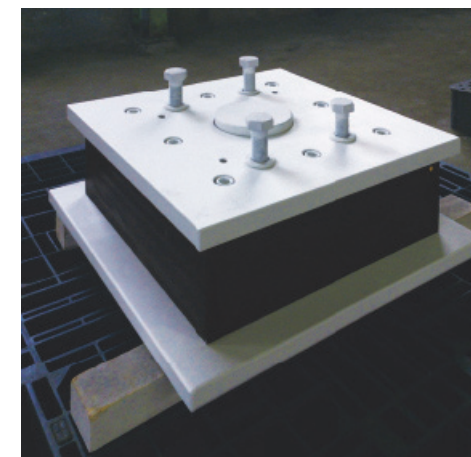
Suehiro Bridge
Prefecture : Tokushima
Year of completion : 1975
Bridge type : Cable-stayed
Products : Bridge bearings with Al-Mg thermal spraying (retrofit)

Work System

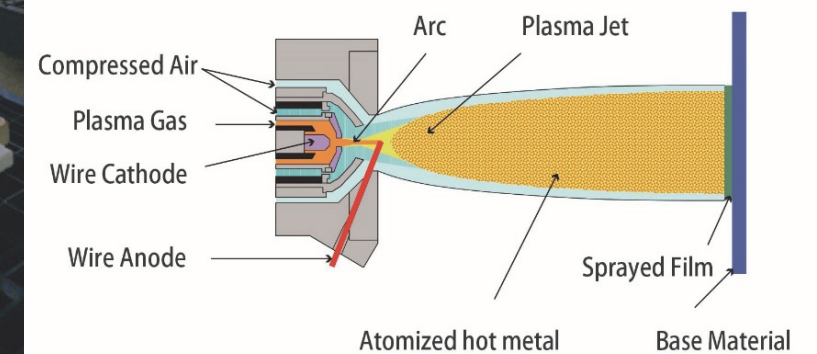
- 35% of the market share for rubber bridge bearings in Japan.
- Currently expanding international market share with a focus on Asia, Southeast Asia, and Africa.
- Design offices in Vietnam and Japan to provide technical support and project-based designs.
- Plants in Vietnam (Hanoi Factory) and Japan (Ibaraki, Tsukuba & Sapporo) equipped with high-end manufacturing and testing equipment to ensure the high quality of our products.

TAPS – Al-Mg Plasma Arc Thermal Spray

Highly durable anti-corrosion protection system for harsh environments



Mechanism of Spraying Method



Field	Bridge construction	Category	Corrosion protection method
Registration, Awards	Jointly developed by three companies in Japan, including West Nippon Expressway Company Limited.		

Technology Overview

TAPS is an advanced corrosion protection technology with high durability in which modified arc welding equipment is used with compressed air to melt and project an aluminum and magnesium alloy wire onto a steel surface to create a protective coating.

[Merits of Adopting Technology]

<Durability> In accelerated cyclic corrosion tests simulating marine environments, the results showed that the Al-Mg plasma arc thermal spray coating is six times more durable than hot-dip galvanizing, and it is capable of providing excellent corrosion protection under marine environments for more than 100 years.

<Cost savings> The maintenance cost is much lower than the conventional method, making it more economical when considering the life cycle cost of the structure.

<Applicability> TAPS can be applied to a wide range of steel parts such as high-strength bolts (including the threads) without affecting their mechanical properties.

<Portable equipment> It is possible to apply the TAPS anti-corrosion coating directly at the construction site.

<Extensive track record> Critical bridge components such as bridge bearings and expansion joints in the Japanese highway system are protected against corrosion with TAPS. This technology has also been applied on bridges located in harsh environments in Bangladesh, the Philippines, etc.

Conditions for Using Technology

- Highly durable anti-corrosion coating especially suitable for coastal areas.
- Applicable to high-strength bolts to meet a variety of requirements.
- Provides superior corrosion protection for critical bridge components such as bridge bearings and expansion joints.

Company	Yasuda Engineering Co., Ltd.	Establishment	1975
Employees	145	Website	http://www.yasuda-eng.co.jp
Address	3-2-26, Shiogusa, Naniwa-Ward, Osaka City, 556-0024, Japan		
Contact	Name: Shigero HAYASHI	Construction Business Division	Development Leader
	Tel: +81-6-6561-5788	E-mail: yasuda-kaigai@yasuda-eng.co.jp	
Overseas Branches		Vietnam (Hanoi, HCMC), Korea (Seoul)	
Possible Implementation Areas		South East Asia (Vietnam, Myanmar, Indonesia)	
Supported Languages		English (e-mail only)	

Business Overview

1. Pipe Jacking
2. General Construction
3. Real Estate Business

- Ranking of Sales <Category of Pipe Jacking>
Within top 2 every year for specialized contractors
- 1st Japan Construction International Award (MLIT) SMEs category

[Pipe Jacking]

Technology for construction of urban tunnels with an inner diameter of 0.3 to 3.0 m. It is used for pipelines such as water and sewage, gas, electric power, and telecommunications.

The RC pipe is connected to the follow-on of the TBM, and the tunnel is built by pushing it into the ground with a hydraulic jack installed in the driving shaft.

On roads where ground transportation and underground objections are congested, the social burden can be reduced compared to the cut and cover tunneling method.

[Original Technology]

- (1) Jyat method: Small diameter pipe jacking method which is equipped with high resolution CCD camera and LED target can be curved construction.
- (2) Milling Mole Method: Milling Mole machine equipped with magnetic survey sensor, special bits and hyperslow jack can cut and pass through steel obstructions like sheet pile or left RC pile in the ground. Won ISTT Award 2012.

Achievements in Japan and Overseas

2013: Jakarta City, Indonesia “Ciliwung River Underground discharge Channel Project”
φ3500 mm ΣL=1.3 km ×2

2015: Vietnam “Binh Duong Sewerage Project” φ300 mm ΣL=500 m

2015: Ho Chi Minh City, Vietnam “Sewerage Project Package G”
φ300 – 1800 mm ΣL=24.7 km

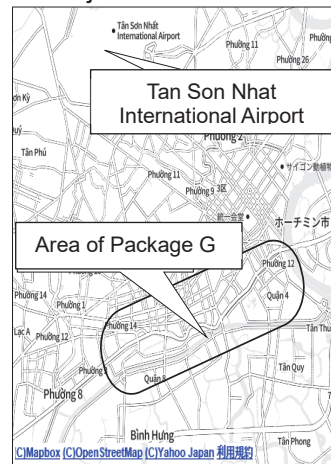
2020: Hanoi City, Vietnam “Yen Xa Sewerage System Project PK-1,2”
φ600 – 2200 mm ΣL=13.4 km



Showing construction site



Maintenance Factory



Work System

- 50 Japanese Engineers were dispatched to Package G project at the peak, and about 80 Vietnamese workers were trained.
- Transported pipe jacking machines from Japan and set up maintenance factory in the suburbs of HCMC.
- Slurry type machines of small diameter(φ300 – 600 mm) and high-density slurry type machines for φ800 – 2000 mm were transported to Vietnam.
- Local company was established in Vietnam. We trained Vietnam staff there and sent them to a project in Japan.
- At the same time, well-trained staffs and workers will be sent to third countries (Indonesia, Myanmar) to drive development of the business.

High-density slurry type pipe jacking method

**Technology for constructing sewage and other utility pipelines
by minimizing traffic impact on busy roads**



High-density slurry type
pipe jacking machine in Vietnam



Showing project site in HCMC

Field	Urban Tunnel	Category	Method
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Technical Overview

[Technical Features]

(Yasuda Engineering can handle slurry type, earth pressure type and small diameter pipe jacking.)

High-density slurry type pipe jacking method consists of the following 5 technologies.

1. High-density slurry is injected into the face, and it can excavate without moving ground surface while stabilizing the ground.
2. Equipped with an air-type pinch valve, it can take into the machine up to a gravel diameter of about 1/4 of the machine diameter.
3. By excavating with a slightly larger diameter than the outer diameter of the pipe and filling lubricant into the overcut portion, the frictional force with the ground is reduced, and long-distance construction of 500 m or more and sharply curved pipe jacking construction such as R30 m are possible.
4. It can handle a variety of soils such as sand, gravel, and clay, as well as boulder formations such as 200 mm class.
5. It can respond to direct connection to the existing structure or other various conditions.

[Merits of Adopting Technology]

- Even on roads with busy traffic, it can build a pipe without affecting traffic except for the shaft part.
- As long-distance pipe jacking is possible, the number of shafts can be minimized, and the impact on traffic can be further reduced.

[Contributions to Solving Issues]

- In cities in developing countries where ground transportation development is moving ahead and underground infrastructure development is lagging behind, business can be carried out while suppressing economic and environmental losses due to traffic hindrance.
- Education on and transfer of construction methods and management technologies to local engineers and workers can be performed.

[Video Link]

<http://www.yasuda-eng.co.jp/>

Conditions for Using Technology

- Not applicable to urban tunnels with an inner diameter of 800 mm or less. Maximum size is up to 3000 mm.
- Since the excavated soil is muddy with a high water content, it is necessary to secure an appropriate disposal site.
- Difficult to construct in deep areas where groundwater pressures is above 0.25 Mpa.

Company	Kidoh Construction Co., Ltd.	Establishment	29 October 1946
Employees	103	Website	http://www.kidoh.co.jp/
Address	4-6-31 Fukushima, Fukushima-ku, Osaka-shi, Osaka, 553-0003, Japan		
Contact	Name: Mitsuo KARIYA	Overseas Business	Title: General Manager
	Tel: +81-3-5289-4773	E-mail: mi.kariya@kidoh.co.jp	
Overseas Branches	Indonesia (DKI Jakarta), Taiwan (Taipei)		
Possible Implementation Areas	Indonesia, Myanmar, Vietnam, Cambodia, Hong Kong, Philippines, Malaysia, Singapore, Taiwan etc.		
Supported Languages	English, Bahasa (Indonesia), Chinese (e-mail only)		

Business Overview

1. Construction by pipe-jacking method for water, sewage and other lifeline pipelines ($\phi 0.2$ m~ $\phi 4.0$ m)
2. Underpasses, utility tunnels, large boxes, shield construction
3. PC bridge construction
4. PC tank construction
5. Other civil engineering construction and other such work

* In 1948, we performed the first pipe-jacking work in Japan, and now have a track record exceeding 2,500 km in total. We have a top rank in the world, especially for long-distance and curve pipe-jacking. Kidoh Construction has the #1 domestic share for pipe-jacking work.

Achievements in Japan and Overseas

- JAPAN: Total Jacking Length: More than 2,535 km (2018)
Total Water Storage Tanks: 1,010 units (2018)
1st Japan Construction International Award (MLIT) SMEs category (2018)
- TAIWAN: From Incorporation in 2006, total pipeline length of 16,000 m (2019)
- HONG KONG: Expansion by Taiwan Kidoh Engineering from 2012
- VIETNAM: $\phi 1500$ mm, 200 m \times 1 span (2008)
- INDONESIA: $\phi 3500$ mm, 570 m \times 2 span (2015), $\phi 1800$ mm, 260 m \times 1 span (2012)
- MYANMAR: $\phi 1100$ mm, 815 m \times 1 span: Bago River-Crossing (2019)



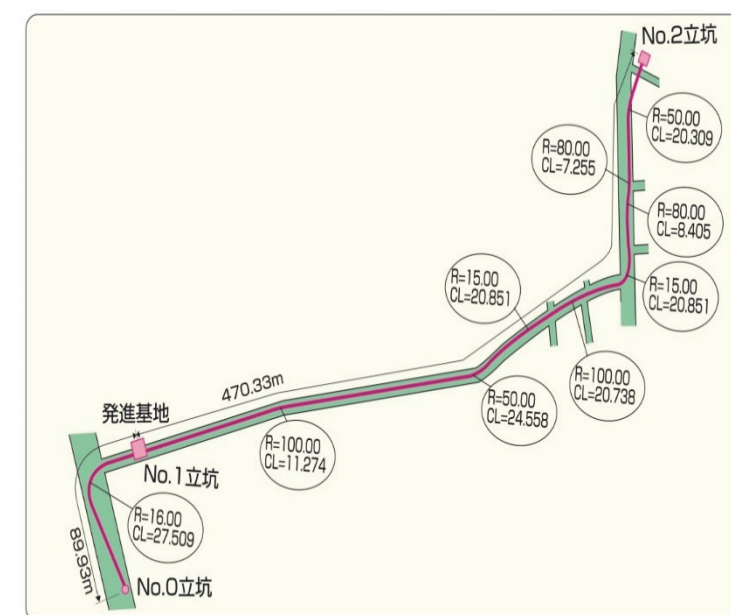
Work System

Past Track Record:

- In Indonesia, we arranged equipment from Japan and dispatched up to 13 Japanese engineers, who collaborated with local workers. Currently, two local engineers are being trained.
- In Taiwan, Japanese engineers and local workers jointly work in construction.
- In Myanmar, jacking equipment and other items were shipped from Japan and 3 Japanese engineers were dispatched, who collaborated with local workers.

Ultimate Method

The Ultimate Method makes it possible to excavate tunnels for an extremely long distance and sharp curves with low propulsion power and high accuracy



Field	Pipe-jacking Construction	Category	Method
Registration, Awards	1994: CENPRA Curve System (Ultimate Method System) Received Technology Certification from Sewerage New Technology Promotion Organization. 1995: CENPRA Curve System won NO-DIG Award.		

Technical Overview

[Technical Features]

- By utilizing a special widening ring and the ULTIMATE Lubricant Injection System (ULIS), it is possible to jack an ultra-long distance of 1 km or more by reducing the peripheral resistance.
- Sudden-Curve line pipe jacking is realized by adopting the GYRO Compass and CENPRA Curve System.

[Merits of Adopting Technology]

- By making long distance, sudden-curve line pipe jacking possible and reducing the number of shafts, the total cost is reduced and the project period is shortened.
- Reducing the number of shafts lead to a reduction in traffic congestion, reduction in social losses and reduction in carbon dioxide due to congestion.

[Contributions to Solving Issues]

- Improves road conditions (chronic congestion) in overcrowded urban areas in Southeast Asian countries.
- Infrastructure development such as water and sewage that has been delayed due to rapid growth can contribute to the development of local companies and the transfer of technology.

[Video Link]

<http://www.kidoh.co.jp/>

Conditions for Using Technology

- Rocks, megaliths and other factors need to be considered for soil type.
- Need to pay attention to the quality of jacking pipe for long-distance or curved-line pipe jacking for overseas projects.

Company Name	Iseki Poly-Tech, Inc.	Establishment	1971
Employees	50	Website	http://www.iseki-polytech.com
Address	Akasaka Community Bldg. 1-1-8 Motoakasaka, Minato-ku, Tokyo, Japan		
Contact	Name: Kazuhiro OKUDA	Dept. of Construction Machinery	Title: Section Chief Deputy
	Tel: +81-3-5786-9212	E-mail: iseki-sales@iseki-polytech.com	
Overseas Branches	None		
Possible Implementation Areas	Indonesia and rest of the world (please consult with us)		
Supported Languages	English and Indonesian		

Business Overview

1. Manufacturer of Pipe Jacking Machines
2. Pipe Jacking Construction

[Original Technology]

- Unclemole (please refer to the next page for details)
A proprietary system in which the cutter head of the pipe jacking machine rotates eccentrically to crush cobbles while jacking, which is applicable to a wide range of soil.
Easy operation with Reflective Steering Guidance (RSG)
- Unclemole Shuttle Method (won the ISTT No-dig Award in 2016)
A method suitable for modern urban areas where construction space is limited in which the machine is retrieved from the start shaft if it is not possible to construct an arrival shaft.
- Unclemole Mini
Construction from a small shaft is possible with split-start and the use of half-pipes.

Achievements in Japan and Overseas

Since our establishment in 1971, we have sold more than 2,500 pipe jacking machines all over the world, and provided advanced pipe jacking technology.

We have also introduced our technology to Asian countries where an increasing amount of pipeline maintenance is expected. For example, we have supported public work projects in Indonesia to install pipelines.

We will continue to contribute to Asia and other regions through underground construction technology.

Work System

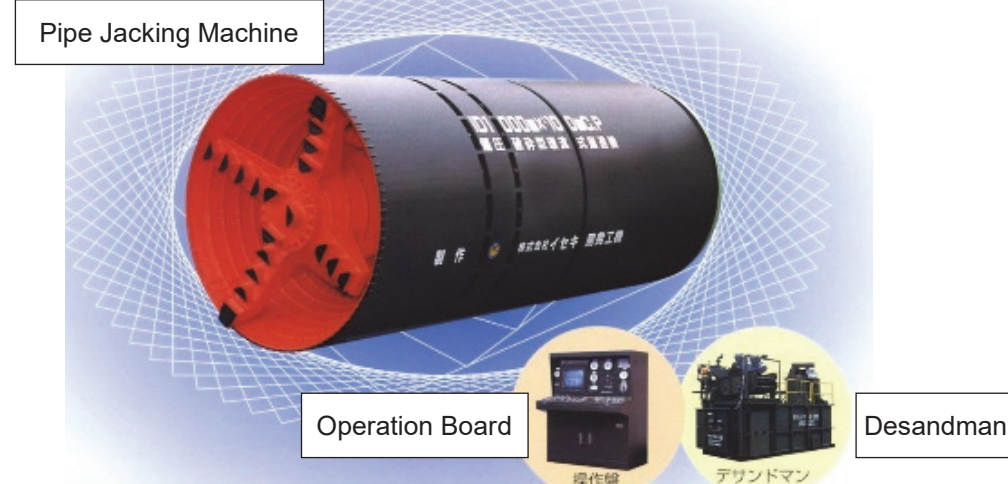
We dispatch our instructors at your request, to provide instruction on machine operation and maintenance on site.

We have local staff in Indonesia who can provide support in Indonesia.



Unclemole Method

Applicable to wide range of soil conditions, pipe types, and pipe diameters with the eccentric crushing system



Field	Jacking Construction	Category	Pipe Jacking
Registration, Awards	Japan Institute of Country-ology and Engineering (JICE): Certificate of General Technology No. 402 The International Society for Trenchless Technology (ISTT): No-Dig Award Winner (1992, 1995, 2016) New Technology Information System (NETIS): CB030046 http://www.iseki-polytech.com		

Technical Overview

[Technical Features]

Unclemole was invented in the 1970's as a slurry type tunnel boring method. More than 2,500 pipe jacking machines with this method installed have been sold all over the world.

1. Applicable to wide range of soil conditions, pipe types, and pipe diameters
Unclemole incorporates proprietary technology in the eccentric crushing system for the cutterhead on the machine head.
Unclemole is applicable to a wide range of soil conditions due to the eccentric rotation of the cutterhead.
2. User friendly operation and maintenance
Unclemole incorporates RSG*. Operators who have never operated Unclemole before can easily operate it.
* RSG (Reflective Steering Guidance) is a device that uses a laser beam to confirm the direction of the machine head.
3. Safe operation with remote control
Operators can operate the pipe jacking machine safely, as the operation board is installed outside the start shaft.
* Please consult with us so that we can propose a model that meets your construction and soil conditions.

[Contributions to Solving Issues]

With the Unclemole method, public infrastructure such as water, sewage, gas, and telecommunications can be provided to improve the living environment. Traffic congestion is minimized since this is a trenchless method.

Conditions for Using Technology

- Pipes for jacking method: Hume pipes, steel pipes, resin concrete pipes, FRP pipes with internal diameters of 200 mm – 3,600 mm
- Applicable soil: Wide range of soil from normal soil, sand and gravel layers, cobble layers, to soft rock

Company	CHIKEN ENTERPRISE Co., Ltd.	Establishment	1980
Employees	111	Website	https://www.ckn.co.jp/
Address	1-4-1 Bawari Kariya Aichi, 448-0810, Japan		
Contact	Name: KAMESHIMA	Oversea section	Title: Director
	Tel: +81-5-6621-0691	E-mail: info@ckn.co.jp	
Overseas Branches	None		
Possible Implementation Areas	Southeast Asian countries		
Supported Languages	English, Vietnamese, Indonesian, Portuguese		

Business Overview

Pipe Jacking / Pipe Rehabilitation / Ground Improvement / Landslide Prevention / Machinery Leasing
Nikkei Construction Sales Ranking (Pipe Jacking Category): 7th in 2017, 5th in 2019, 5th in 2020

*no data in 2018

[Original Technology]

(1) Speeder Path Method:

Compared to the conventional method, the speeder path method has the feature of being able to drive forward in sand layers with a large amount of groundwater by 60 m or more.

In addition to high-precision starting, it is compatible with a wide range of soils and can be started from a small shaft (φ1.5 m to φ2.0 m).

Compatible with VP and VM PVC jacking pipes with a nominal diameter of Φ200 mm to 350 mm.

(2) MM Hole Method:

The MM hole method is a revolutionary multipurpose manhole construction method that is used for pipe jacking shafts by directly press-fitting concrete materials into the ground with rotation.

Since the reinforced concrete frame is directly press-fitted, there is no need for temporary earth retaining nor to pull out the earth retaining sheet pile.

As a result, construction time and costs are significantly reduced.

Achievements in Japan and Overseas

2016: Pipe jacking work in Jordan (Northern Syria)

2018: Pipe jacking work in Jordan (Balqa Governorate)

2019: Pipe jacking work in Myanmar (Yangon Metropolitan Waterworks Improvement Project)

2017: JICA SME support project in Indonesia (Survey for Small Diameter Pipe jacking)

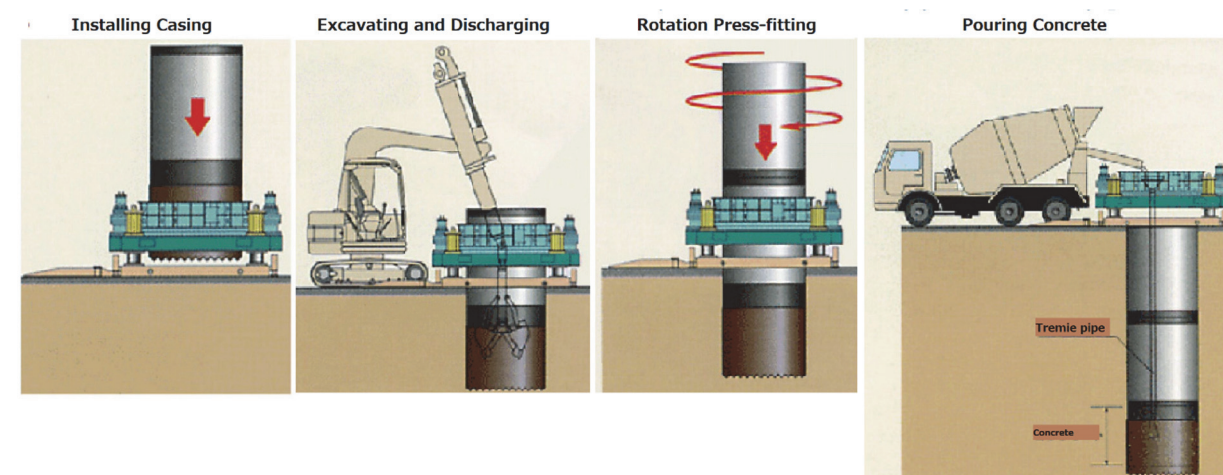
2019: JICA SME support project in Indonesia (Dissemination of Small Diameter Pipe jacking)

Work System

- Since 2014, we are accepting technical interns and hiring construction engineers from Vietnam.
- From 2021, we are planning to accept Indonesian technical interns.

MM Hole

Speedy, Space saving, Safe Manhole Construction



Field	City tunnels	Category	Method/Material
Registration, Awards	Japan Construction Technology Certification (Civil engineering materials / products / technologies, road maintenance technology) Examination number No. 0224		

Technical Overview

[Technical Features]

The MM hole is a revolutionary multipurpose manhole construction method that is used for pipe jacking shafts by directly press-fitting concrete into the ground by means of rotation.

[Merits of Adopting Technology]

- Cost savings due to shorter construction period
No need for earth retaining sheet piles. Therefore, the construction period is greatly shortened, and it is cost saving.
- No need for cutting entrance ring
The entrance ring is pre-installed. (Applicable pipe nominal diameter: 500 or less)
- High-precision construction
All-around press-fitting machine (ART machine) enables installation without misalignment.

[Contributions to Solving Issues]

Since there is little vibration and noise, it can be constructed in a short period of time even in urban areas near underground buried objects and houses.

[Video Link]

<https://www.nicovideo.jp/watch/sm4500929>

Conditions for Using Technology

It is applicable for a wide range of soil types. (For welded joints and non-welded joints)

Soil Type	Scope	Note
Sandy soil	$N \leq 50$	Note: Additional measures may be required in the following cases: Soil with unstable excavation bottom, ground with low bearing capacity, aquifer, consolidated clay and bedrock, etc.
Cohesive soil	$N \leq 30$	
Gravel soil	$N \leq 50$	

Company	Sohatsu Systems Laboratory Inc.		Establishment	2000
Employees	25		Website	http://www.sohatsu.com/
Address	San-nomiya Denden Bldg. 64, Naniwa-machi, Chuo-ku, Kobe, 650-0035, Japan			
Contact	Name: M. WAKAMATSU		Operations Department	Title: Manager
	Tel: +81-78-325-3320		E-mail: mariko@sohatsu.com	
Overseas Branches		Vietnam (Hanoi)		
Possible Implementation Areas		Global		
Supported Languages		English, Vietnamese, Malay, Nepali		

Business Overview

[Target Systems]

- Road Tunnel Ventilation Control Systems
- Road Traffic Monitoring Systems
- Subway Ventilation Control Systems

[Business]

Planning/Analysis: Energy Saving, Maintenance, Fire Safety, Risk Analysis, Simulation

Experiment: Field Test, Simulation

Research & Development: Software, Hardware, System Development

Manufacture & Construction: Sensor, Ventilation Control Panel, Jet-fan Inverter Control Panel, Sensor Unit, Control Unit, Signal Unit

Maintenance: Equipment, System, Data Diagnosis, Repair, Overhaul, Periodic Inspection, Remote Maintenance

Achievements in Japan and Overseas

[Shipping Record]

- Road Tunnel, Over 100 Jet-fans, Variable Speed Controller JINV (Japan)
- Applicable to All Jet-fan manufacturers
- Market Share 100% (Variable Speed Controller, Japan)
- JICA ODA PROJECT (Nepal, Philippines)

[Evaluation]

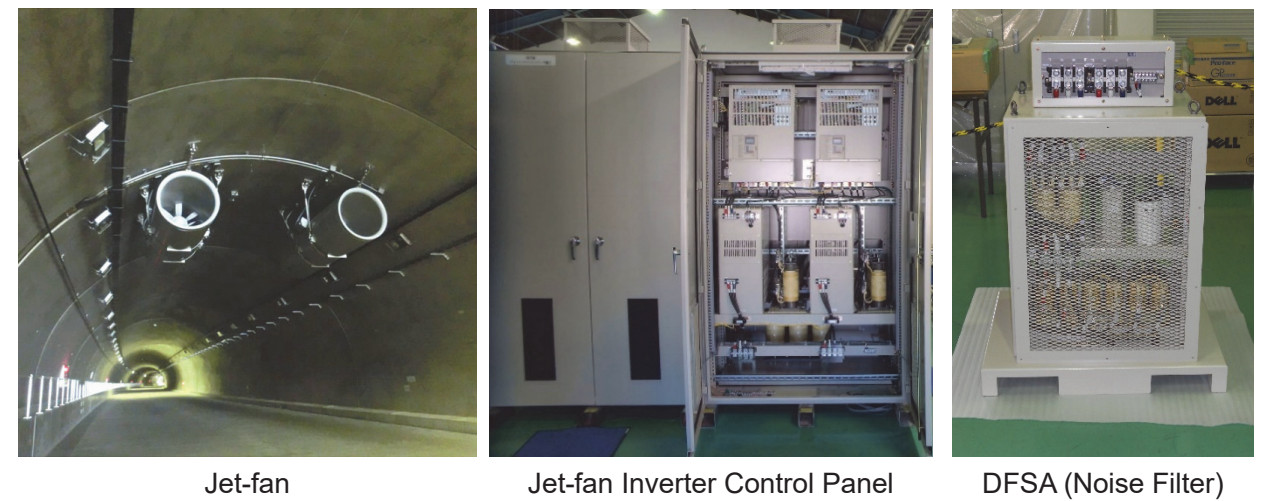
- 13th ISAVVT Best Paper Award
- Certification (Japan) NETIS, JAPAN BLAND PROJECT, Invention Award, Manufacturing Award
- PIARC Member of Tunnel Ventilation
- Collaborative Research (University of Engineering Hanoi, 2019-2023)

Work System

- Research and Development Hubs (At University of Engineering Hanoi, Vietnam)
- Manufacture Base (Vietnam): All Asian Market (Save Cost, Local Price)
- Manufacture Model (Fabless): Local Partnership
- Core Technology (DFSA Filter): JAPAN Made (Credibility, Identity)

Jet-fan Inverter Control System JINV

Tunnel Ventilation Control System - Energy Saving, Fire Safety, Noise Free, Low Cost-



Field	Tunnel Ventilation	Category	System
Registration, Awards	NETIS: KK-130014 Patent No. 5300775, Invention Award, Manufacturing Award 13th ISAVVT Best Paper Award, JAPAN BLAND PROJECT (2019-2020)		

Technical Overview

[Technical Features]

- Noise Filter DFSA: Independently Developed to Realize Jet-fan Inverter Control
- Reduce The Life Cycle Cost: Energy Saving-Over 30%, Versatility with Peripherals
- Emergency Ventilation Control: Safe Evacuation of Passengers

[Merits of Adopting Technology]

- Cable Length up to 2,000 m: Realized through Technology of DFSA
- Non Shielded Cable, Versatility Motor (Our Technologies): Shielded Cable, Special Motor (Existing Technologies)
- Any Type of Jet-fans, Any Manufacturer
- Many Type of Simulations: From Planning to Maintenance

[Contributions to Solving Issues]

- (Development Country) Low Quality Air Environment in Tunnel (smoke density and air condition): Optimization, Unstable power Supply. Energy Saving and low load Ventilation Control. Necessity of Localization (Cost and Technology).
- (Mountains Areas) Higher Fire Risk (Steep Slope): Emergency Ventilation Control
- (Urban Areas) Complicated Structure and Long Length Tunnel (Need Higher Technology): Ventilation Control for Fire safety, and High Temperature Countermeasures.

[Video Link]

<http://www.sohatsu.tunneldb.com/>

Conditions for Using Technology

- Two Way Traffic with Jet-fan

Company	NIKKEN KOGAKU CO., LTD.	Establishment	1964
Employees	98	Website	https://www.nikken-kogaku.co.jp/English/
Address	17F Nittochinishishinjuku Bldg., 6-10-1 Nishishinjuku, Shinjuku-ku, Tokyo 160-0023, Japan		
Contact	Name: Yosuke TOGA	International Division	Title: Manager
	Tel: +81-3-6361-0028	E-mail: int-div@nikken-kogaku.co.jp	
Overseas Branches	Vietnam (Hanoi City)		
Possible Implementation Areas	East Asia, Southeast Asia, South Asia		
Supported Languages	English (e-mail)		

Business Overview

1. Leasing and product sales of formwork for fabrication of wave-dissipating blocks and footing-protection blocks
2. Leasing and product sales of formwork for fabrication of river revetment blocks, etc.
3. Sales of Geosynthetics (Geotextile etc.)
4. Sales of fieldstone products

[Main Business Development and Activities in Overseas Markets]

- Supply of formworks for fabrication of “wave-dissipating blocks” and “footing-protection blocks”
- Dispatch supervisors to the site and provide technical guidance to construction contractors
- Business contract and technical support for hydraulic model experiments

[Record of Awards]

- May 2013: First Place Winner for “PIANC De Paepe-Willems Award” (first award in Asia)
Target technology: Breakwater reinforcement method “SUBPLEO FRAME (SPF)”
- June 2014: Second Place Winner for “PIANC World Congress in San Francisco, YP Award”
Target technology: Concrete containing amino acid “Environmentally Active Concrete (EAC)”
- March 2019: Received “The 2nd JAPAN Construction International Award” SMEs Category



Achievements in Japan and Overseas

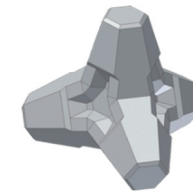
Construction Period	Project Name	Procuring Entity	Summary of the Construction
2012	South Korea: Pohang Young-il Bay South Breakwater	Pohang Regional Office of Oceans and Fisheries	Breakwater, Armor block for rubble mound. Fabrication and installation work of STONE-BLOCK 10t.
2014	Vietnam: Nghi Son Refinery and Petrochemical Complex Project, Route Neuve	Nghi Son Refinery Petrochemical Ltd.	Breakwater, Wave-dissipating blocks. Fabrication and installation work of RAKUNA-IV 8t, 12t.
2018	Vietnam: Chan May Port Breakwater Construction Project	Thua Thien Hue province	Breakwater, Wave-dissipating Blocks. Fabrication and installation work of RAKUNA-IV 16t, 32t.

Work System

We do not contract for construction work directly, but manufacture formworks for the fabrication of wave-dissipating blocks locally, such as in Vietnam, and supply them to the construction site after concluding a contract with a construction company that includes the use of industrial property rights. Also, in order to ensure the quality of Japanese technology, we dispatch supervisors to the site at the start of fabrication and installation of the blocks to provide technical guidance and advice directly to the construction company, as well as guidance based on relevant manuals and guidelines.

Wave-dissipating Block “RAKUNA-IV”

New type of wave dissipating block with 4 hollows on the joint part of 4 legs



RAKUNA-IV



Breakwater for Chan May Port in Vietnam



Breakwater for Nghi Son refinery in Vietnam

Field	Ports and harbors, Fishing ports, Coasts, Rivers	Category	Products
Registration, Awards	NETIS: HRK-080001-VE Vietnam National technical Standard: TCVN 9901: 2014, TCCS 02: 2017, TCVN 11736: 2017		

Technical Overview

[Technical Features]

1. Compared to conventional products, the hollows and leg toes interlock with each other, which suppresses damage transmission and improves wave-resistant stability.
2. The hollows increase the surface roughness, which reduces the energy of the waves and improves the wave-dissipating effect.
3. The characteristic large hollows increase the porosity, reducing the number of blocks used, and improving economic efficiency.
4. There are many corners in the hollow, which helps the implantation and growth of algae, and the tranquility of the hollow provides a habitat for marine creatures.
5. The formwork structure is simple, block fabrication is easy, and high-quality construction is possible according to the guidelines for installation.
6. It is possible to design appropriately according to the construction site conditions by conducting hydraulic model experiments.

[Merits of Adopting Technology]

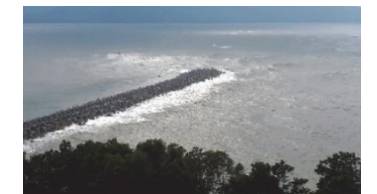
- Compared to general wave-dissipating blocks overseas and those in Europe and the United States, the structure is flexible, resilient, and tough due to the high stability of the blocks and the double-layer installation method. Therefore, it is hard for the blocks to be destroyed and they have high safety.
- Since the number of blocks used is reduced due to the high porosity, the amount of concrete used can be reduced and the block fabrication/installation work period can be shortened. Shortening of the construction period will lead to reducing the burden on the environment.

[Contributions to Solving Issues]

Constructing a highly safe breakwater in ports developed in developing countries reduces the risk of stopping operation of the port. In addition, it is easy to maintain and can reduce maintenance costs, so the life cycle cost is excellent.

[Video Link]

https://www.youtube.com/watch?v=I_2F8pKlb0A
<https://www.youtube.com/watch?v=qIJg3oFqjFg>
<https://www.youtube.com/watch?v=ObNiIXKyB1k>



Conditions for Using Technology

- We conduct hydraulic model experiments to determine the suitable type of breakwater (caisson breakwater, sloping breakwater) to make the appropriate design possible.
- In addition to the design standards in Japan, it is possible to design based on overseas standards such as BS6349.

Company	Onoda Chemico Co., Ltd.		Establishment	January 1923
Employees	344		Website	http://www.saita-hd.co.jp
Address	JPR Crest Takebashi Bldg., 3-21, Kanda Nishiki-cho, Chiyoda-ku, Tokyo, Japan			
Contact	Name: Akira ENOSHITA	International Business Division		Title: General Affairs Dept. Manager
	Tel: +81-3-6386-7051		E-mail: kaigai@chemico.co.jp	
Overseas Branches		Vietnam, Myanmar		
Possible Implementation Areas		Vietnam, Myanmar, etc.		
Supported Languages		English, Vietnamese, Burmese (e-mail only)		

Business Overview

We are a special construction company engaged mainly in ground improvement. Centering on design, sales, construction, testing, and technical development for ground improvement, we undertake the following:

1. Ground improvement, lightweight material earthworks, and other specialized civil engineering work as the main contractor or subcontractor
2. Design, estimation, and consulting for specialized civil engineering work
3. Special concreting (manufacture, sales and repair of super-fast-setting concrete)
4. Shield tunneling (backfilling, foam injection, eruption prevention, soil/sand transformation system, etc.)

Of all ground improvement, we are particularly good at solidifying soft ground with a cement-based solidification material. We have diverse high-quality methods that we have developed independently, thereby contributing to infrastructure enhancement and recovery from earthquakes both in Japan and abroad in the fields of foundation work, seismic measure, liquefaction protection, and other measures for structures.

Currently, we are working to expand our overseas business mainly in Vietnam and Myanmar.

Achievements in Japan and Overseas

2006: Vietnam

Saigon East-West Highway Construction Project PK2 (JMM method)

To prevent of sliding of levee and shore bank, and to increase passive earth pressure, we carried out from water floating barge.

On land, we executed the project to prevent the road embankment from subsiding.

2015 to 2019: Vietnam

HCMC Urban Railroad #1 Construction Project, Zone 1B

(JMM method, FM method)

The FM method was used for the zone in front of the Opera House and the new building worksite for Ba Son Station.

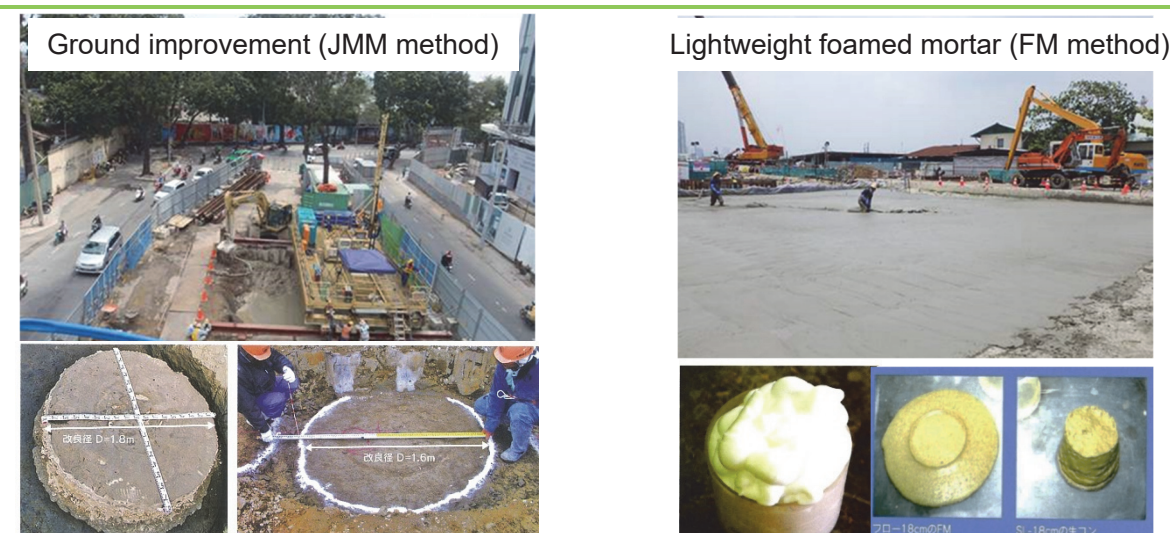
In the subway cut-and-cover zone, the bottom ground was improved with the JMM method.

Work System

- In 2016, an office was opened in Yangon, Myanmar. In 2017, a local subsidiary was set up in Ho Chi Minh, Vietnam.
- The HCMC Subway Construction, Zone 1b, was undertaken by 10 Japanese engineers and 20 Vietnamese workers.
- We employed and trained HCMC resident personnel (2 Japanese and 2 local recruits) and personnel who underwent practical skill training (4 local workers living in Japan).

JMM Method, Onoda FM Method

Methods for improving soft ground to achieve maximum effect with minimum equipment



Field	Civil engineering and architecture in general	Category	Methods, materials
Registration, Awards	JMM method: former KT-030041-V, partially recommended for fiscal 2014		

Technical Overview

[Technical Features]

JMM method:

- Combining concepts and experience of jet grouting and mechanical mixing, this method constructs large-diameter ($\phi 1.2\text{--}1.9\text{ m}$) columns, making it suitable for all kinds of soft ground. The rod head and work execution can be modified with different ones to enable the machine to access the displacement object.
- By a special travelling slide base machine with a boring machine is used to achieve high mobility, low vibration and low noise. A self-travelling construction machine type is also available, which offers efficient construction.

FM method:

- Cement milk or mortar is injected with foam produced with a special device to manufacture foamed lightweight material.
- Unit weight can be set freely between 0.5 and 1.2 kN/m².

[Merits of Adopting Technology]

JMM method:

- Construction is now possible in narrow spaces inaccessible with large three-point pile drivers and in soft ground with low bearing capacity. Moreover, high-pressure jetting enables contact execution of each column, and can therefore be used to increase the earth pressure balance of retaining walls, to reinforce objects, and for many other purposes.

FM method:

- This method uses types of soil and sand more lightweight than those applied for embank, thereby reducing consolidation settlement due to rises in embank loads. Carried out with a highly flowable material, this method can be used to fill cavities of certain sizes.

[Contributions to Solving Issues]

- JMM method: Effective for ground improvement in urban districts and other areas with limitations on construction conditions.
- FM method: Effective for consolidation settlement measure by offering a lightweight material for embank in Southeast Asia, where soft marine clays are widespread.

Conditions for Using Technology

- Inapplicable to areas with no cement supply. The FM method requires that an applicable foaming agent be imported from Japan.
- In principle, the column diameter and strength for the JMM method should be set based on the results of in-situ trial tests.

Company	TENOX KYUSYU CORPORATION	Establishment	December 1987
Employees	160	Website	https://www.tnx.co.jp/
Address	5F Kubara Honke Tenjin Bldg, 4-1-11 Tenjin, Chuo-ku, Fukuoka City, Fukuoka, Japan		
Contact	Name: Jin Yeonho	Overseas Department	Title: Assistant Manager
	Tel: +81-78-325-3320	E-mail: mariko@sohatsu.com	
Overseas Branches	Vietnam, Myanmar, Cambodia (Corporation), Korea (Branch)		
Possible Implementation Areas	South-East Asia, Korea		
Supported Languages	English, Korean		

Business Overview

We are a company that specializes in foundation work, centered on the ground improvement method. We have developed and attained vast technological capabilities to carry out foundation work to support structures for both buildings and civil engineering structures. We have developed distinctive ground improvement methods (Teno-column method, Column Approach method, Multi-wall method, CCC method), piling methods (TN method, CMJ method), and steel piping methods (ATT column method, EAZET method) which are “Eco-friendly”. We are capable of providing a complete foundation work system from engineering and procurement service to construction.

Achievements in Japan and Overseas

1. We entered Vietnam in 2003 with the introduction of ground improvement technology (Teno-column method), and expanded this work as a widely used method for the building foundation and civil engineering fields.
2. We have completed various projects such as ODA and private projects in Vietnam, Myanmar and Singapore, and accumulated vast overseas experience as described below.



Singapore, Thomson East Coast Line T228 Project

No.	Project Name	Client	Place	Period	Construction Method	Vol.
Vietnam						
1	SP-PSA Thi Vai Container Terminal	Penta Ocean	Thi Vai	2008/1~2008/7	Deep Soil Mixing	180,000m ³
2	Sao Mai-Ben Dinh Port Basement	PVC-MS	Vung Tau	2011/5~2011/7	Deep Soil Mixing	177,000m ³
3	TBO Tan Son Nhat - Binh Loi Outer Ring Road Project2	GS Engineering & Construction Corp	HCM	2011/12~2012/2	Deep Soil Mixing	152,000m ³
4	Duyen Hai 1	Guangdong Electric Power Design Institute	Tra Vinh	2013/6~2014/6	Deep Soil Mixing	233,000m ³
Singapore						
5	Marina Coastal Expressway C483	Samsung C&T	Marina South	2009/4~2012/4	Deep Soil Mixing	570,000m ³
6	Common Services Tunnel MCO2	Singapore Piling Pte Ltd	Marina South	2010/8~2012/2	Deep Soil Mixing	44,000m ³
7	Thomson East Coast Line T228	Nishimatsu Construction Co., Ltd.	Marina South	2015/1~2016/11	Deep Soil Mixing	140,000m ³
Myanmar						
8	New Taketa Bridge	Tokyo Construction Co.Ltd.	Yangon	2015/8~2016/4	Deep Soil Mixing	13,400m ³

Overseas achievements (mainly large-scale)

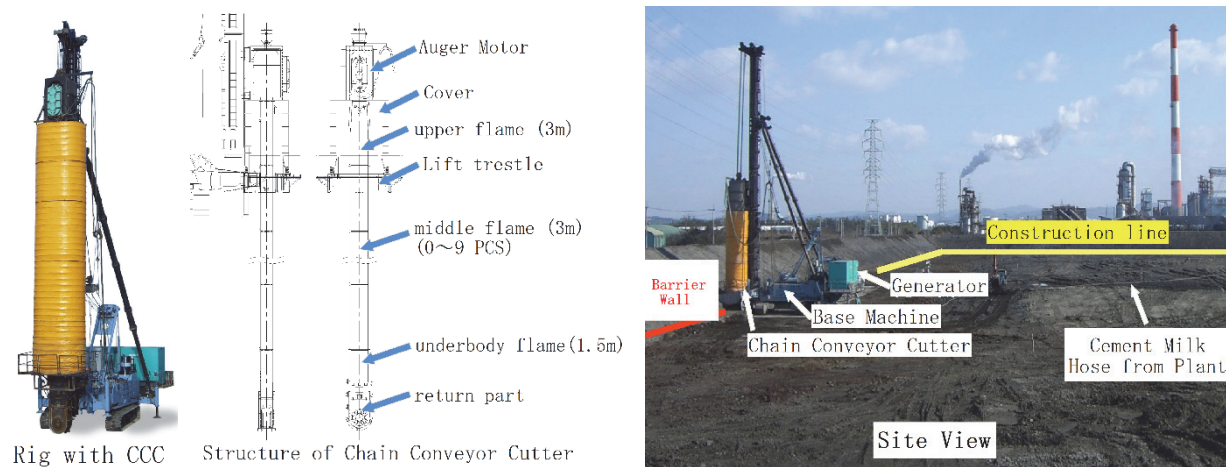
3. We continue to conduct sales activities with a focus on Southeast Asia.

Work System

1. We have a dedicated team which provides foundation work in Vietnam with machinery, materials and skilled local staff. The Vietnamese manpower and resources are able to support work in the South-East Asia area. For projects in Singapore, we are able to coordinate manpower and materials from Japan and Vietnam to tap on the high technical skill and economic viability. This consists of the essential materials & engineers from Japan & skilled labor and materials from Vietnam.
2. We can flexibly reconfigure resources to suit the construction conditions and technical difficulties we may encounter on site.

“CCC Method” Chain Conveyor Cutter Method

Ground improvement method - Excavates and Agitates Ground
by Rotating Scraper connected to Chain Conveyor (vertical direction)



Field	Earth retaining, impermeable work, ground Improvement work	Category	Construction Method
Registration, Awards	NETIS registration number: QSK-120005-V		

Technical Overview

[Technical Features]

1. Direct stirring & mixing method: Capable of creating seamless improved ground even in different geological layers.
2. Rectangular column: Effective improvement rate (practically 100%).
3. Able to improve the ground regardless of the hardness of the ground. → Able to penetrate & mix in ground with a maximum N value of 100.

[Merits of Adopting Technology]

1. Able to achieve consistent and uniform improved ground as the work is performed in the vertical direction with a chain conveyor cutter.
2. Can be installed even on ground with a support layer hardness of N value 100.
3. The amount of solidifying material (i.e., Cement), is reduced since the vertical chain conveyor cutter ground improvement method is able to achieve uniform quality.

[Contributions to Solving Issues]

When earth retaining and the foundation for the structure are both required, the earth retaining work can be performed using the CCC (chain conveyor cutter) method, and with the same resources, the foundation work using the Deep Soil Mixing Method can be performed (only by changing the auger motor attachment). This achieves an effective and productive combination.

[Video Link]

<http://ccc-kyokai.com/index.html>

Conditions for Using Technology

[Conditions related to the natural environment]

- Can be constructed under most weather conditions throughout Japan.
- Fall prevention measures for the rig are required in adverse weather conditions.
- Construction under freezing conditions requires mitigation measures to prevent freezing of water.

[Conditions related to Work Area]

- The footprint size of the machine, i.e. DH658 standard, is about 50 m² (5 m x 10 m).
- The plant, silo, pump & ETC installation area occupies around 200 m² with a flexible configuration according to the location of materials.

Company	Honma giken Co., Ltd	Establishment	1987
Employees	39	Website	http://www.honmagiken.co.jp
Address	983-3 Teraji, Nishi-ku, Niigata-city, Niigata 950-1104, Japan		
Contact	Name: Akihiro ITO	Engineering Department	Title: Technical director
	Tel: +81-25-233-6181	E-mail: itoua@honmagiken.co.jp	
Overseas Branches	None		
Possible Implementation Areas	Vietnam (We have experience in field inspection)		
Supported Languages	English (e-mail only)		

Business Overview

We are a specialized contractor for construction industry and ground improvement work.
e.g.: Soil stabilization, solidification of soft soils and construction of underground continuous walls
We own suitable machines and manage construction in-house as described below:

- Ground improvement work
 - Dry jet mixing method: 3 units (Maximum penetration depth: 33 m)
 - GI column method (Single-auger deep soil mixing): 1 unit (Maximum construction depth: 24.5 m)
 - Double Mixing method (Single-auger deep soil mixing): 1 unit (Maximum construction depth: 10 m)
 - PowerBlender method (Shallow-middle Range Mechanical Mixing): 4 units (Maximum construction depth: 8 m)
 - Compaction Grouting Denver-system: 4 units(Liquefaction counter measuring method)
- Mud treatment work
 - MUDIX method (Continuous mud treatment method) 1 unit
- Underground continuous wall construction work (Excavation Support wall/Water-cut off wall etc.)
 - Trench cutting re-mixing deep wall method 2 units (Maximum construction depth: 60 m, Wall thickness: 550 to 1000 mm)

Achievements in Japan and Overseas

[MUDIX method] processing capability: 100 m³/h

Applications: To solidify and reuse dredged soil

Past achievements for rivers and port in Japan:

- Ibaraki port Hitachi District, 3rd wharf
- Second class river: Ishikawa River
- First class river: Toyonogata River

[PowerBlender method]

Applications: To improve soft soil in the original position or use pre-improved soft soil for embankments

- Asahi Atsumi Road: Hihara area Improvement work No. 2
- Niigata port, West port area: Embankment work for waste disposal areas No. 7 and No. 8
- Oodori River: 3-year project for ground improvement work



Work System

- Dispatch of Japanese engineers and technicians
- Consider development of local human resources

MUDIX METHOD, POWER BLENDER METHOD

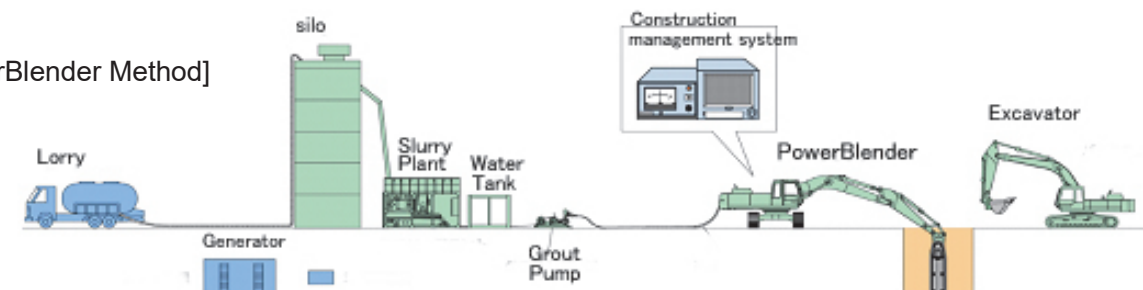
These methods can be applied for soft ground and dredged soil

[MUDIX Method]



Drilling→Soil carrier→Soil-gathering→Solidification→Curing→Carry out→Reuse

[PowerBlender Method]



Field	Weak ground/soil treatment	Category	Method
Registration, Awards	Power blender method NETIS: QS-180038A		

Technical Overview

1. MUDIX METHOD

[Technical Features]

This method continuously and efficiently mixes soft mud with stabilizing agent in a cylindrical mixing chamber.

* Since the stirring efficiency is good and powder / granular material is used, the amount of stabilizing agent added is decreased and the strength is quickly developed.

[Merits of Adopting Technology]

• Safety and non-polluting: The agent is completely contained, and noise and vibration are minimized, making it relatively safe.

[Contributions to Solving Issues]

• This is an effective method for dredging/landfilling ports/rivers with reused-dredged soil.

[Video Link] <https://www.deidoken.gr.jp/>

2. POWER BLENDER METHOD

[Technical Features]

This is a construction method in which soft soil is moved horizontally while stirring in the vertical direction while improving material is added to improve the ground.

* By continuously stirring in the vertical direction, it is possible to improve the soil even in multi-layered ground.

[Merits of Adopting Technology]

This method provides mobility even under difficult conditions with conventional mechanical agitation methods, such as on narrow sites and sloping terrain.

[Contributions to Solving Issues]

• This method can improve the ground in the original location and increase the ground strength around existing and new structures at a low cost.

[Video Link] <http://www.power-blender.com/>

Conditions for Using Technology

None in particular. We will consider the detailed construction plan for each case and provide our response.

Company	Murakamijuuki Co.,Ltd	Establishment	May 1962
Employees	68	Website	http://www.murakamijuuki.co.jp/
Address	515 Ikenobe Mikicho, Kitagun, Kagawa, 761-0701, Japan		
Contact	Name: Shusaku MURAKAMI	Title: President	
	Tel: +81-87-813-5576	E-mail: s-murakami@murakamijuuki.co.jp	
Overseas Branches		Vietnam (Ho Chi Minh City)	
Possible Implementation Areas		Vietnam	
Supported Languages		English (e-mail only)	

Business Overview

Murakamijuuki is a nationwide construction company, which is based in Kagawa, Japan and work as a contractor for foundation works below, transportation and crane works mainly for public works contracted by the Ministry of Land, Infrastructure, Transport and Tourism (MLIT), local governments, etc.

1. Construction of cast-in-site diaphragm wall
2. Construction of ground improvement
3. Construction of pile driving and pile pulling

In addition to our many achievements especially in cast-in-site diaphragm wall construction all over Japan, we have an excellent track record overseas in special ground conditions including cohesive soil and limestone. In November 2019, the ground improvement technology (MITS Construction Method) was developed in Vietnam, and was expected that it is highly suitable for the soft soil of Mekong delta region. The Ministry of Transport of Vietnam issued TCVN (Technical Standard in Vietnam) certificate to the technology. We are aiming to receive local construction orders and build relationships with local partners.

Achievements in Japan and Overseas

2011: Established Vietnam Office based on overseas expansion plan

2014: Participated in MLIT-led delegation to Vietnam

“Feasibility Survey with the Private Sector for Utilizing Japanese Technologies in ODA Projects for Introduction of Soil Improvement Technology for Mekong Delta Waterway Revetment Construction” of Japan International Cooperation Agency (JICA)

June 2016: “Verification Survey with the Private Sector for Disseminating Japanese Technologies for Soil Improvement Technology for Mekong Delta Waterway Revetment Construction” of JICA

December 2018: Trial construction was implemented in Vietnam

November 2019: Ministry of Transport of Vietnam has issued TCVN (Technical Standard in Vietnam) certificate to the MITS Construction Method

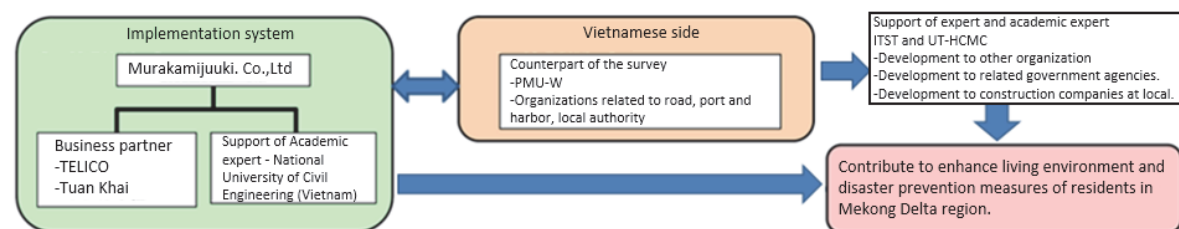


←Construction site

Trial site→



Work System



MITS Construction Method CMS System

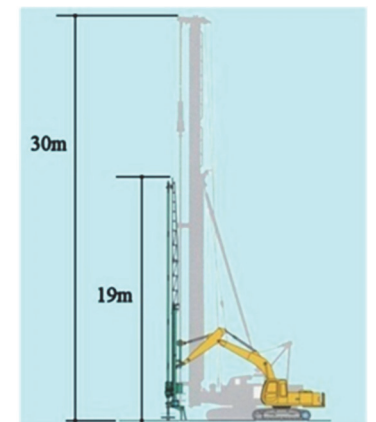
Ground improvement construction method that mixing efficiency is enhanced and base machine is downsized by combining the special mixing blade and middle pressure injection of cement slurry



Revetment Construction



Construction from the barge



Drawing of MITS method

Field	Ground improvement	Category	Construction method
Registration, Awards	- Ministry of Transport: NETIS QS-000013-V, Technology of promotion of utilization in 2011, Technology for comparison of design in 2012		
	- Advanced Technology Center: Advanced Construction Technology and Technology Review Certification, Technology Certification No.2301 acquired on 20th September 2011		
	- Ministry of Transport in Vietnam: Technical Specification No.2163/QD-BGTVT issued on 18th November 2019		

Technical Overview

[Technical Features]

MITS method has features of both mechanical mixing method and jet-grouting method. It is the deep mixing method that mechanical mixing blade drills and mixes, and simultaneously cement slurry is injected with middle pressure under 15Mpa. It can create improved soil-cement column with high uniformity in short time. The main features are shown below.

- a. By combining mixing blade and middle pressure injection, its base machine can be downsized, and improvement diameter can be increased.
- b. By combining mixing and injection, co-rotation of improvement ground does not occur, and displacement of surrounding ground is curbed.
- c. Quality of improved soil-cement column is enhanced because of middle pressure injection mixing and forward/reverse rotation of mixing blade.
- d. Increasing mixing efficiency, construction time is shortened. And advantageous in economic efficiency is increased.
- e. It can work flexibly to create improved soil-cement columns for middle-deep depth with low pollution.

[Merits of Adopting Technology]

It can construct in the narrow site or from barge because machinery is downsized.

[Video Link]

<https://www.youtube.com/watch?v=guSQeYYc4fM>

Conditions for Using Technology

- It can create column with improvement diameter 500 to 1,600 mm for weak clay soil ground.
- In large sized construction which 2 axis type machines can construct without problems, construction efficiency and economic efficiency become worse since the drill mechanism is one axe type.
- The construction method is dedicated for weak soil. (It is possibility that it cannot agitate and penetrate when gravel or sand soil with high N value are in the soil characteristics)

Company	SST Association Inc.		Establishment	2001
Employees	34		Website	http://www.sstkyokai.co.jp
Address	862-1 Yamadabashi, Ichihara, Chiba 290-0021, Japan			
Contact	Name: Minoru KIKUCHI	Tokyo Branch	Branch Manager, Director of FC Businesses	
	Tel: +81-3-5829-6461		E-mail: kikuti@sstkyokai.co.jp	
Overseas Branches		Vietnam (Hanoi) (under consideration)		
Possible Implementation Areas		Vietnam (under consideration)		
Supported Languages		English (e-mail only), Vietnamese		

Business Overview

Using the SST Method, a column-type ground improvement technology developed by SST Association Inc., we are engaged in the following business.

- (1) Development of technology related to the SST Method
- (2) Training of engineers in the design and implementation of the SST Method
- (3) Dissemination of the SST Method
- (4) Contract work using the SST Method



Achievements in Japan and Overseas

[Domestic performance]

Over 1,700 ground improvement projects for building structures and civil engineering structures (April 2006 to March 2020)



Apartment building



Shopping mall



Riverbank retaining wall

[Surveys in Vietnam]

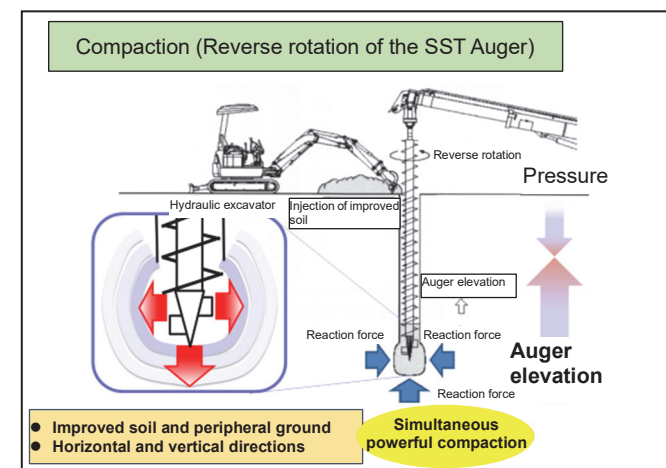
- November 2017 to present: Field surveys, discussions with Vietnam Institute for Building Science and Technology (IBST), FS survey (currently underway)
- October 2018 to July 2019: Laboratory unconfined compression test using local soil conducted jointly with National University of Civil Engineering

Work System

- A team of 3 technical workers works with one set of equipment (dedicated auger, drilling and pole-erecting vehicle, hydraulic excavator).
- 2 Vietnamese employed as engineers are currently receiving in-house training. We plan to employ 3 more technical interns.
- We are considering establishing a Vietnamese subsidiary and developing a work system for bringing in dedicated augers, etc. from Japan.

SST Method

Powerful compaction in both horizontal and vertical directions creates high-strength columns



The SST Method in operation

Field	Ground improvement	Category	Method
Registration, Awards	NETIS: KT-150002-VR / Building Technology Performance Certificate: GBRC Performance Certificate No. 11-06 Rev. 3 (Mod. 1)		

Technical Overview

[Technical Features]

- The dedicated auger is designed to excavate the ground efficiently in forward rotation and strongly compact and backfill in reverse rotation.
- The material for ground improvement is not just conventional cement-based solidifying materials; sand is added for higher density compaction.
- The SST Method is not an underground agitation system, but a displacement system and work can be carried out while visually checking the excavated soil and the condition of the drilling hole from above ground.

[Merits of Adopting Technology]

- High-powered compaction creates high-strength, high-bearing columns, enabling a reduced total number and length of columns.
- As the work can be performed with compact equipment without the need for plant facilities, it can be done in confined sites.
- As the improved soil and surrounding ground are strongly compressed by compaction, there is basically no surplus soil other than unsuitable soil.
- As the robustness by compaction is apparent immediately afterward, the curing period required with conventional methods is unnecessary, resulting in a shorter work period.
- By carrying out the work with visual checks from above ground, the quality of the columns is improved and the work can be managed certainly.
- The SST Method can be applied to soils such as organic soil and soft ground conditions outside the scope of conventional methods.

[Contributions to Solving Issues]

- Cost reductions and shorter work periods promote the development of housing and social infrastructures.
- The method is effective especially on confined sites where conventional methods are difficult and sites where the bearing capacity of piles is not required.
- As the work can be performed with just a dedicated auger and a machine to power it, the method can be introduced easily and at low cost.

[Video Link]

<https://www.youtube.com/embed/fsKgcnZnaU0?rel=0>

Conditions for Using Technology

- Improvement depth: up to 12 m, long-term ground contact pressure: 300 kN/m² or less (if more, check by static loading test)
- Minimum 2.5 m access path and 4 m × 10 m work space are required.
- The distance from the neighborhood boundary to the center of the column must be more than 600 mm.

Company	AOMI Construction Co., Ltd.		Establishment	1917	
Employees	347		Website	https://www.aomi.co.jp	
Address	Sumitomo Realty & Development Ochanomizu-building, 2-3 Sotokanda, 2-Chome, Chiyoda-ku, Tokyo, 101-0021, Japan				
Contact	Name: Katsumi OOKORI		Soil Improvement Department		Title: Manager
	Tel: +81-3-5209-7876		E-mail: jiban@aomi.co.jp		
Overseas Branches		None			
Possible Implementation Areas		Southeast Asian countries			
Supported Languages		English			

Business Overview

Our core businesses are marine civil engineering, land civil engineering, and soil improvement. We are one of the leading marine constructors in Japan, and excel in marine civil engineering and construction of port facilities. We have been engaged in marine civil engineering and developed the land in Japan surrounded by the sea since our foundation.

Marine civil engineering: Landfill dredging, port maintenance and breakwater construction

Land civil engineering: Roads, tunnels, water and sewage systems, river maintenance

Soil improvement: Methods to improve soft ground (liquefaction countermeasures)

[Original Technology]

Our soil improvement methods that suppress and prevent liquefaction, fluidization, and sandblasting which occur during earthquakes include a density-increasing method that increases the strength of the ground and a method that solidifies the ground and suppresses underground stress. With our soil improvement technology, we will reduce the impact of disasters and damage caused by earthquakes.

Link: <https://www.aomi.co.jp/en/tech/index.html>

Achievements in Japan and Overseas

[Domestic Achievements]

- Tokyo International Airport
- Kansai International Airport
- Chubu Centrair International Airport

[Overseas Achievements]

- Immersed Tunnel Foundation Work in Hong Kong and Macao
- Connecting Bridge (People's Republic of China)
- Immersed Tunnel Foundation Work for Busan Port (Republic of Korea)
- Construction Work for Ehoala Port (Republic of Madagascar)



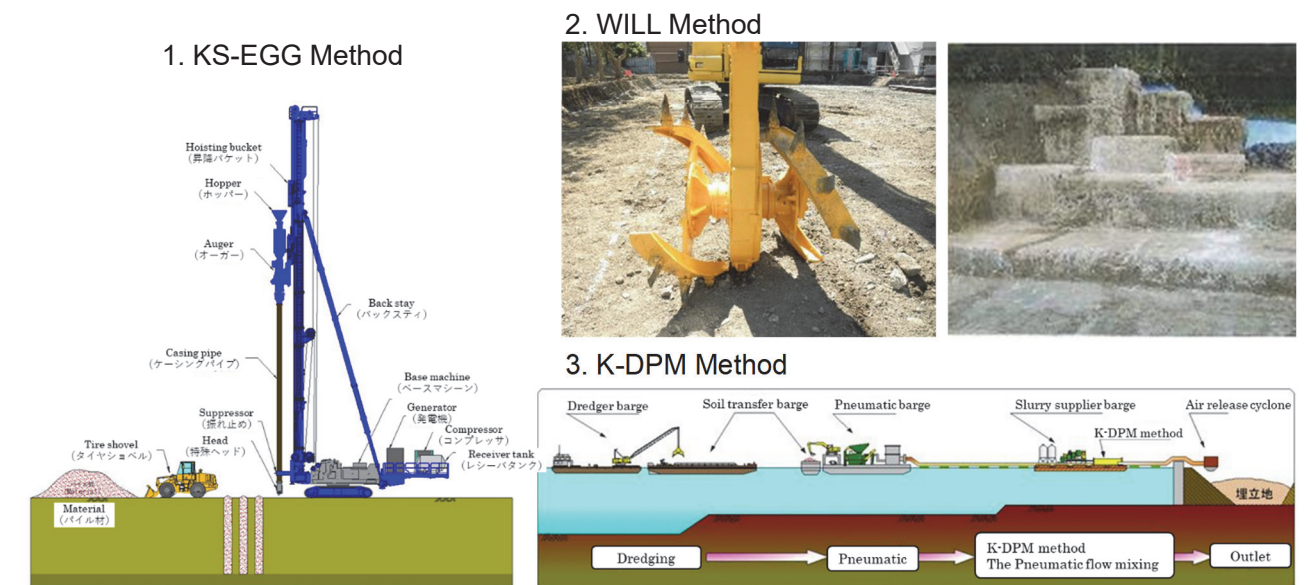
Hong-Kong Macao
Connecting Bridge

Work System

Please feel free to send us an inquiry.

1. KS-EGG Method 2. WILL Method 3. K-DPM Method

Advanced technical knowhow for marine civil engineering and soil improvement



Field	Soil Improvement	Category	Method
Registration, Awards	1. NETIS: KTK-180001-A 3. NETIS: QS-090004-VE (Semi recommended technology 2019)		

Technical Overview

[Technical Features]

1. KS-EGG Method

The KS-EGG method is a low-noise, vibration-free SCP method on land.

This is one density improvement method to improve the stability of the ground, such as increasing the bearing capacity of viscous ground as a measure against liquefaction of sandy ground.

2. WILL Method

This method uses a special stirring blade attached to the tip of a backhoe type base machine to inject a cement slurry into the soft ground while forcibly agitating and mixing in-situ soil to form a stable improver. This allows not only soft and viscous ground, but also sandy ground and gravel ground with an N value exceeding 30 to be accommodated, with a middle layer improvement of up to 10 m depth (Up to 13 m).

3. K-DPM Method

The K-DPM method is one solidification method for the purpose of recycling dredged soil. A mixed loading section is installed diagonally in the middle of the pumping pipe, and cement slurry is added to the dredged soil that is pumped as plug flow from the solidifying material supply shaft installed in the center of the mixing section. By expanding the mixing section and installing it diagonally, a large turbulent flow is generated in the mixing section, enabling uniform mixing by means of stirring.

[Contributions to Solving Issues]

Utilizing our know-how and achievements in marine civil engineering and soil improvement technology over many year, we make contributions to infrastructure development and construction, especially in the fields of ports and airports, reclaimed land and artificial island construction.

Company	Heisei Technos Co., Ltd.		Establishment	1989	
Employees	15		Website	http://www.heisei1.com	
Address	2-8-9 Hishie, Higashiosaka City, Osaka 578-0984, Japan				
Contact	Name: Tetsuya FUJITA		Development Department, Construction Division		Title: Development Leader
	Tel: +81-72-966-5585		E-mail: info@heisei1.com		
Overseas Branches		None			
Possible Implementation Areas		Anywhere in the world			
Supported Languages		English (e-mail only)			

Business Overview

- Subsidence rehabilitation and rectification
- Strengthening of ground bearing capacity

Achievements in Japan and Overseas

We have a long and proven track record in subsidence rectification, including releveling buildings and other structures affected by the Great Hanshin Earthquake, Chuetsu Earthquake, Tohoku Earthquake and Kumamoto Earthquake.

In addition to releveling structures affected by consolidation settlement of reclaimed land or soft ground or construction of adjacent buildings, in recent years JOG technology is employed as the standard method of releveling Japan Railways tracks, a task which requires advanced technical capabilities.



Taipei Public Library



Taipei department store



New Zealand art gallery



NZ 7-storey apartment building

[Business Performance (orders received)]

Taiwan: Foundation improvement for Taipei Public Library Songshan Branch (June 2013), and other works

Korea: Construction and ground reinforcement of Smart Techno Tower and building restoration (July 2016), and other works

New Zealand: Releveling of Christchurch supermarket building (September 2013), and other works

UK and Europe: Various works since 2015

Work System

[Taiwan]

- The machines were stored in a local rental warehouse and 4 or 5 Japanese staff members were dispatched as needed. Chemicals were exported from Japan when required.
- Assistant workers were employed locally for cement mixing and other jobs.

[Korea]

- Initially, in 2000 it was intended to send equipment from Japan and dispatch 2 or 3 employees to work as contractors, but later it was decided that a local specialized construction company would purchase the machines and the Japanese staff would receive a royalty as technical advisors. However, since 2004 domestic construction work in Korea has been outsourced to a local specialized construction company.

[New Zealand]

- On the occasion of the Canterbury earthquake in 2011, Heisei Technos formed a business partnership with a construction company headquartered in Australia.
- Equipment was leased and, depending on the project, Japanese staff were dispatched as needed to provide construction guidance.

JOG (Jacking on Grout) Method

An efficient way of releveling sunken or tilted structures



Box culvert



General housing - Before/After releveling



JR tracks

Field	Chemical grouting	Category	Construction method
Registration, Awards	NETIS registration number: KK-100010-A Ground Engineering Award from Kansai Branch of Japanese Geotechnical Society, 2004		

Technical Overview

[Technical Features]

- JOG is a jacking method using grout that eliminates the complex work processes required with more traditional methods. This groundbreaking and efficient way of robustly releveling and rehabilitating structures affected by differential settlement involves injecting a special grout through 20 to 40 mm diameter holes at fixed intervals in an injection pipe installed in the foundation.

[Merits of Adopting Technology]

- JOG is a Heisei Technos patented technology that enables precision releveling to the nearest millimeter of both light and heavy loads.
- JOG is not only highly effective for subsidence rectification, but also for rectifying differential settlement induced by soft ground or liquefaction. (The improvement effect is similar to that of the top-shaped concrete block foundation method.)

[Contributions to Solving Issues]

- Compared with demolishing and rebuilding structures, time and cost are greatly reduced.
- Work is completed in a short time even in factories, warehouses and other businesses that continue to operate while the work is under way.
- Only the target structure can be restored without affecting the adjacent structures.
- JOG is a structure-friendly leveling method that applies no unreasonable localized force.

[Video Link]

<http://www.heisei1.com>

Conditions for Using Technology

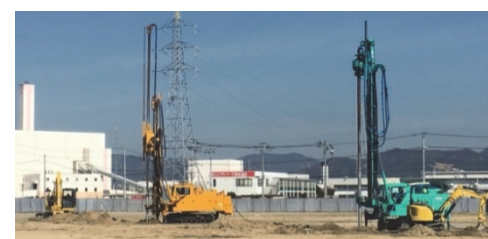
- It is difficult to apply the JOG method if the foundation and piles are connected. (Depending on the situation, JOG leveling may be possible by cutting off the edge.)
- As the grout is injected immediately beneath the foundation, the foundation slab must be of a certain width. (JOG is not suitable for continuous footing foundations.)
- The rigidity of the structure is maintained.

Company	Miho Technos Co., Ltd.	Establishment	July 30, 1958	
Employees	192	Website	https://www.miho.co.jp	
Address	25 Showamachi, Yonago City, Tottori, 683-0037, Japan			
Contact	Name: Masakazu HASHIMOTO	Land Support Division, Basic Technology Office		Title: Director
	Tel: +81-859-30-4100	E-mail: m.hashimoto@miho.co.jp		
Overseas Branches		None		
Possible Implementation Areas		Vietnam		
Supported Languages		Japanese		

Business Overview

1. General construction industry
2. Ground improvement work
3. Sales, brokerage and management of real estate

- No. 1 sales as local general contractor in Tottori prefecture (2019)
- Original technology (Belong to association)
3SG Construction method (Mechanical stirring type deep mixing treatment method)
- Selection by Ministry of Economy, Trade and Industry Regional future leader
- Weekly diamond, 1,100 general contractors nationwide, No. 44 in "Momentum Construction Company Ranking" in the "power to survive" ranking (December 2016)



Construction scenery with 3SG Construction method

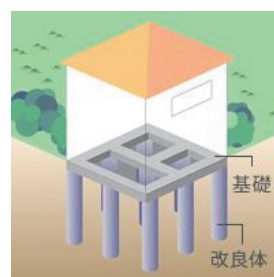
Achievements in Japan and Overseas

3SG Construction method

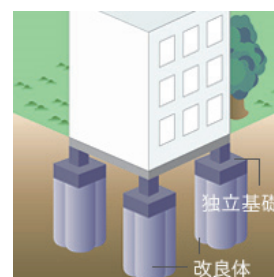
(GBRC Performance proof No. 07-21-2, NETIS Registration No. KK-180052-A)

Based on the deep mixing treatment method for which there are many achievements in the past, the 3SG Construction method has been reborn as a higher quality method with new patented technology. Currently, there is strong demand for technological support in society, and acquisition of the GBRC Performance proof and NETIS reliable construction methods enables usage nationwide.

* Completed 9,909 construction projects in Japan (As of November 2020)



Low-rise buildings



Medium-rise building

Work System

We are training Vietnamese workers and engineers in Japan to respond to the shortage of workers in Japan. In the future, we will promote and commercialize the 3SG Construction method with Vietnamese workers and engineers by establishing a local corporation and conducting training.

3SG Construction Method

Deep mixing treatment method with outstanding quality and technology that supports ground safety



Field	Foundation and reinforcement of buildings, structures and civil engineering, basics of embankment, stabilization measures for retaining walls	Category	Deep mixing, treatment method, slurry stirrer
Registration, Awards	GBRC Performance proof No. 07-21-2, Japanese Patent No. 4125310 NETIS Registration No. KK-180052-A		

Technical Overview

[Technical Features]

With the mechanical stirring type deep mixing treatment method (Slurry stirrer), slurry discharge ports are provided above and below the stirring blade. Discharge is provided from below when excavating and stirring, and discharge is provided from above when pulling up and stirring. By discharging the slurry, this technology enhances the efficiency of improving the structure.

[Merits of Adopting Technology]

- Quality improvement by improving the uniaxial compression strength of piles, and the process is shortened by improving the efficiency of structure improvement.
- Improved economic efficiency by reducing labor costs due to shortening of process, and achieving construction in a narrower space.
- Because the slurry discharge port can be switched up and down, it is expected that variations in strength can be reduced.
- About 3 people per construction team, with no need for large-scale temporary construction.

[Contributions to Solving Issues]

- In narrow areas such as developed urban areas, ground improvement work can be done
- Buildings can accommodate houses and low-rise buildings (up to RC4F)

[Video Link]

3SG Construction Method Association HP: <http://www.sss-g.com/>

NETIS HP: <https://www.netis.mlit.go.jp/netis/pubsearch/details?regNo=KK-180052%20>

Conditions for Using Technology

- Specifications: Maximum depth 20.5 m, Pile diameter ϕ 400 mm - 1,300 mm
- Not applicable for ground with many gravel layers and boulders, ground containing acidity and sulfates, ground with strong groundwater, spring water, underground water or industrial waste, ground where underground obstacles have accumulated.

Company	Taiyo Kisokogyo Co., Ltd.	Establishment	May 3, 1958
Employees	221	Website	http://www.taiyoukiso.co.jp
Address	107 Yanamori-cho, Nakagawa-ku, Nagoya, Aichi, 454-0871, Japan		
Contact	Name: Toshiya MUTSUGA	Sales & Marketing Division	Director and General Manager
	Tel: +81-52-362-6351		E-mail: main@taiyoukiso.co.jp
Overseas Branches	None		
Possible Implementation Areas	Southeast Asia (Other areas will be discussed separately)		
Supported Languages	English (e-mail only)		

Business Overview

General construction

- Special civil engineering work
Underground work (diaphragm walls, removal of underground obstacles, ground improvement, propulsion, contaminated soil treatment, geological surveys, etc.)
Slope stabilization, solar power plant installation
- Building work



Diaphragm wall construction



Slope stabilization

Achievements in Japan and Overseas

- Contract work
Taiwan: Propulsion work (2 projects)
Dia.1800 mm mud density system L=276 m
Dia.1000 mm mud density system L=300 m
Democratic Republic of the Congo:
Ground improvement work (1 project)
Deep mixing method
Dia.1000 mm L=5.1-7.1 m×403 columns
- Technical guidance in diaphragm walls (TRD method)
China (Tianjin, Shanghai, Wuhan, Qingdao/7 projects)
USA (Florida/2 projects)



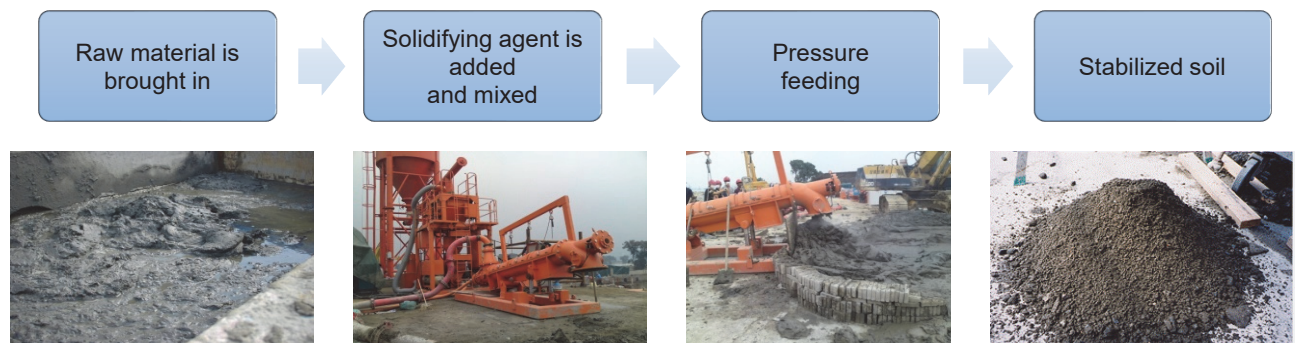
Tianjin, China
Diaphragm wall construction

Work System

- Special machinery is brought from Japan and general purpose machines are procured locally.
- Construction managers, heavy equipment operators and machine maintenance instructors are dispatched from Japan and human resources are trained through technical instruction for local workers.

Excavated mud and gravel recycling system (Pipe processing system)

Ground improvement technology turns excavated mud and dredged soil into suitable material for embankments and banking



Technical Overview

[Pipe processing system]

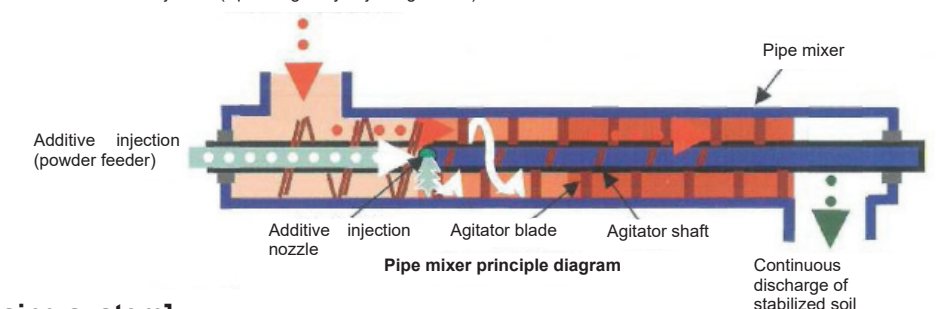
This highly efficient mixing system continuously mixes the excavated mud and dredged soil with powder or liquid additives inside the pipe during the pressure feed process. As the process is continuous with no inhibiting of the speed of the mud flow in the pipe, high-volume mixing is possible with light, compact equipment. The system turns excavated mud, dredged soil, etc. into suitable material for embankments or banking at the site.

[Principle of pipe mixer]

The gravel and additives are shear stirred and forcibly mixed by the agitator blades attached to the shaft which rotates inside the pipe at high speed.

The additives are injected directly into the pipe mixer from the injection nozzle on the agitator shaft for a highly efficient stirring effect.

Gravel injection (Specific gravity adjusting device)



[Features of pipe processing system]

1. Continuous mixing enables large-scale processing with a compact system.
2. As the plant is movable, the cost of transporting mud, stabilized soil, etc. is reduced.
3. The additives are discharged by the pipe mixer shaft for an excellent agitating effect.
4. The specific gravity of the stabilized soil is kept constant by the specific gravity adjusting device.
5. The powder feeder ensures high quality, stable kneading of powders.
6. Both powder and liquid additives can be applied.
7. As the additives are supplied inside the pressure feed pipe, heavy metals can also be handled.

Conditions for Using Technology

- If the mixture contains pebbles, driftwood, waste, etc. bigger than 20 mm, sorting will be necessary.
- The plant yard must be approx. 30 m × 50 m = 1,500 m².



Ozawa Civil Engineering and Construction Co. Ltd.

Company	Ozawa Civil Engineering and Construction Co., Ltd.	Establishment	June, 1913
Employees	54	Website	http://www.ozawa-doboku.co.jp/
Address	6 Morita Cho, Naka Ward, Hamamatsu City, Shizuoka Prefecture, Japan		
Contact	Name: Tomohisa OZAWA	Title: President & CEO	
	Tel: +81-53-453-2891	E-mail: tomohisa@ozawa-doboku.co.jp	
Overseas Branches		Vietnam (Hanoi)	
Possible Implementation Areas		Please ask.	
Supported Languages		Vietnamese (phone, e-mail), English (e-mail only)	

Business Overview

Ozawa Civil Engineering and Construction Co. Ltd. is a company with a history of more than 100 years which was founded in 1913. Since the introduction of the pile machine in 1957, we have specialized as professional contractors for earth retaining and basic pile work (foundation pile work), and at present our primary business is in the field of 'press-in piling' using the Silent Piler® manufactured by GIKEN Ltd. With our highly experienced employees and a large variety of cutting-edge special machinery and equipment, we have gained much experience and accumulated many achievements while successfully facing various soil conditions, adapting to different working environments and fulfilling customers' requirements, and have thus been highly evaluated. Furthermore, we became a GTOSS member and acquired GM1 category classification offered by Giken Engineering Group in March 2014 in order to contribute to the development of social infrastructure by making full use of special construction technology. We are expanding the scope of our activities nationwide, centering on Hamamatsu City, Shizuoka Prefecture, which has been our base since our foundation. In addition, the locations where we can utilize the construction technology we have developed so far is not limited to domestic locations, and we are now actively developing activities for overseas projects.

Achievements in Japan and Overseas

March 2017 -present:	Participated in Japanese Official Development Assistance project (The Kanchpur, Meghna and Gnmtd 2nd Bridges Construction and Existing Bridge Rehabilitation Project) in Bangladesh (Foundation for steel pipe sheet pile well (press-in installation with steel pipe piler))
February 2019:	Established a joint venture in Hanoi, Vietnam (Through a joint venture of 3 companies including Hashimotogumi Corporation)
January 2020 -present:	Earth retaining works (steel sheet pile press-in installation by Silent Piler) at Ben Thanh Central Station on Ho Chi Minh Metro Line 1 (CP1a)



Work in in Bangladesh



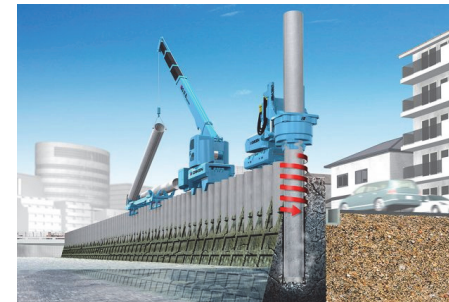
Work in Ho Chi Minh

Work System

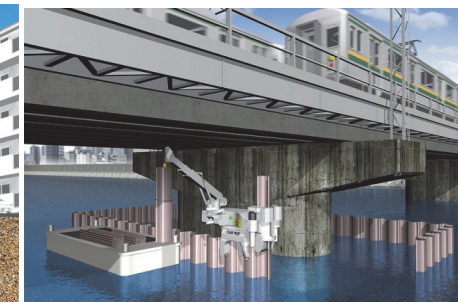
In the above two projects, our employees were assigned to stay in the country to carry out press-in work (including welding work). In the future, we aim to build a human resource development system for "globalization," which employs Vietnamese employees in Japan and assigns them to overseas construction work after learning construction techniques which are accepted in the Japanese market.

Pile press-in method

Noise-free and vibration-free press-in method that fundamentally solves the construction pollution that was previously inevitable for piling work.



Construction of revetments without removing existing revetments



Pier reinforcement under bridge girder



Disaster restoration

Field	Disaster prevention, environment, transportation, flood control	Category	Construction method
Registration, Awards	NETIS registration number: SK -190009 -A, SK -170006 -A Registered as GIKEN Ltd. 2016 Japan Society of Civil Engineers Award for Technology "Underwater steel sheet pile Press-in method in narrow space below railway bridge" Rotary cutting press-in machine "Gyro Piler": The fifth "Monodzukuri Nippon Grand Award", "Minister of Economy, Trade and Industry Prize"		

Technical Overview

[Technical Features]

This noiseless and vibration-free pile driving method has fundamentally solved the construction pollution caused by noise and vibration by using the press-in principle, which was inevitable with ordinary pile driving.

Since the reaction force is obtained from the existing piles, the weight of the press-in machine itself is not required, enabling the construction machine to be made lightweight and compact.

[Merits of Adopting Technology]

- Can be applied to various field circumstances such as narrow areas, and under girders of bridges where overhead clearance is restricted.
- Vibration has little impact on neighboring buildings, so it is effective for construction in close proximity to buildings in urban areas.
- By operating all machinery and equipment on finished piles, "construction without temporary work" can be realized, which eliminates the need for temporary work such as temporary piers and roads, enabling all processes to be completed on the piles alone.
- By adopting the press-in method, the total construction cost can be reduced by eliminating the temporary structures required with the conventional method.
- Safe without risk of overturning because the press-in machine is always held by the press-fitted pile.
- Construction can be carried out without restricting the working hours even in areas where traffic is heavy and putting restrictions such as road closures in place are difficult even at night.
- Precise control of press-in piles enables construction of complicated construction shapes with high accuracy.
- High-quality finished piles can be constructed by checking and controlling the performance of piles in process.

[Video Link]

https://www.giken.com/en/video_gallery/

https://www.giken.com/ja/video_gallery/

[Our Business Relationship with GIKEN Ltd.]

GIKEN Ltd. is a company that designs, manufactures, and sells Silent Piler®, a pile press-in and extraction machine, and holds various patents related to the press-in method.

Ozawa Civil Engineering and Construction Co. Ltd. aims to popularize the press-in method in Vietnam and other countries as a user, and GIKEN Ltd. supports each user in order to widely spread the method throughout Japan and overseas.

Conditions for Using Technology

Please consult us.

Name	Nihon Base Co., Ltd.	Establishment	1969
Employees	43	Website	https://nihon-base.co.jp
Address	4-22-6 Nishiogu, Arakawa-ku, Tokyo, Japan		
Contact	Name: Tatsuya KOMAZAWA	Title: President and CEO	
	Tel: +81-3-3810-2351	E-mail: tkom@nihon-base.co.jp	
Overseas Branches		Vietnam, Taiwan	
Possible Implementation Areas		Vietnam, Indonesia, Myanmar, Philippines, etc.	
Available Languages		English, Vietnamese	

Business Overview

1. Pile foundation construction business: Steel Pipe Sheet Pile, Steel Pipe Pile inner excavation construction (NB method, Steel Pipe Pile hydraulic hammering method)
2. Existing pile removal business: Large-diameter cast-in-place piles can also be removed, and the pile holes after pulling out the piles will be restored to a strength close to that of the original ground.
3. Underground obstacle removal project: Double auger method, Delta method (Underground obstacle removal work using a special compact electric rotary all casing machine in a narrow area)

Achievements in Japan and Overseas

2015: Indonesian Jakarta MRT construction PHC piling construction technical guidance
 2016: Indonesian Jakarta MRT construction PHC piling construction proposal
 2018: Technical explanation to local government agencies regarding PHC piling construction in Myanmar
 2019: Signed MOU with FECON (Hanoi), Vietnam regarding technical sales
 In Japan, in the replacement work of the Ise Ohashi bridge over the Nagara River (ordered by the Ministry of Land, Infrastructure, Transport and Tourism), the NB method was adopted to minimize noise for neighboring residents and not to hinder the swimming upstream of ayu, spawning, and the habitat of fry. The construction was completed with a significant reduction in environmental load in the field environment under vibration and noise measurement, and was commended by the director of the Hokusei Office, Chubu Regional Development Bureau, Ministry of Land, Infrastructure, Transport and Tourism.



Work System

- 2015: Dispatched 4 Japanese engineers and trained about 50 Indonesian workers in Indonesia
- Since 2017, hired highly-skilled personnel from Vietnam, and after a three-year training period, they will play a leading role in local technical guidance
- In 2019, in partnership with Vietnam FECON, we plan to develop as a construction JV on a project basis in Vietnam and Southeast Asian countries.

NB Piling Method (Inner Excavation with Vibro)

Construction method that enables long pile construction and hard layer breakthrough, which was not possible with conventional steel pipe sheet pile and steel pipe pile construction



Field	Bridge construction	Category	Construction method
Registration, Awards	NETIS: KT-160090-VE Ministry of Land, Infrastructure, Transport and Tourism Chubu Regional Engineering Bureau Hokusei National Highway Director Award		

Technical Overview

[Technical Features]

Technology for performing high-precision pile press-fitting by temporarily activating a low-noise, low-vibration NB vibro device when breaking through hard ground or soft rock ground while excavating steel pipe sheet piles and steel pipe piles in the middle excavation.

[Merits of Adopting Technology]

- Prevents the following pile trouble that occurs with existing hammering methods and enables high-quality construction.
 1. Buckling and breakage of piles, deformation and damage of joints in the case of steel pipe sheet piles in the hammering method. → With the NB method, the inside of the pile is excavated and press-fitted while grasping the ground condition using the ICT management device, so the pile and steel pipe can be press-fitted to the support layer without damaging the sheet pile joint.
 2. With the hammering method, the pile bends when the stratum is inclined. → With the NB method, the verticality of the pile can be corrected during construction, ensuring high-precision verticality.
 3. With the hammering method, the pile is damaged or stays high in the hard intermediate layer. → With the NB method, even if there is a hard intermediate layer, it can be drilled and press-fitted without putting an excessive load on the pile, so the hard intermediate layer can be broken through and the long steel pipe sheet pile construction of long steel pipe piles is also possible (pile length 100 m based on actual results).
- Shortening of construction period / reduction of construction cost: If it is necessary to change the construction method due to the above trouble with the existing construction method, it is necessary to consider additional auxiliary construction methods and additional construction costs. → NB construction method can avoid the above trouble risk, so from the beginning of design On-site support is possible at the top.

[Contributions to Solving Issues]

- Japan's newest pile foundation construction method with excellent earthquake resistance and durability: With the NB method, piles are constructed while grasping the conditions such as ground hardness and integrated excavation resistance value according to the depth by ICT management equipment. It is possible to construct piles with excellent earthquake resistance and durability according to the situation.
- Prevention of river flooding in the rainy season: By adopting steel pipe sheet pile piers for the foundation of bridges in rivers, the occupancy rate of the piers in the river can be reduced, and river flooding in the rainy season can be prevented. Compared to the hammering method, the NB method is superior in vertical precision construction of steel pipe sheet piles, so high-precision steel pipe sheet piles can be constructed.
- Consideration for environmental load and ecosystem: When piles are driven by the hammering method, loud noise and vibration are always generated, which places a heavy burden on local residents and environmental load. The NB Vibro of the NB method is a machine with low noise and low vibration, and at the same time, it starts up in a short time (about 15 minutes a day on average), so the impact on the surrounding residents and the natural environment is minimized. This minimizes the impact on fish swimming upstream and spawning and minimizes the impact on the habitat of rare organisms and spawning of rare birds in forest areas.

[Video Link]

<https://nihon-base.co.jp/service1>

Conditions for Using Technology

- Suitable for construction of long steel pipe sheet piles and steel pipe piles.
- Low noise and low vibration. Consideration for local residents and the surrounding natural environment -Can break through the hard intermediate layer. Compatible with soft rocks.
- Excellent vertical accuracy of piles, suitable for construction of steel pipe sheet piles.

Company	Hassyu Kenki Co., Ltd.	Establishment	1984
Employees	69	Website	http://www.hassyukenki.com/
Address	17 Nishimabashisaiwai-cho, Matsudo-shi, Chiba, Japan		
Contact	Name: Nobuhito NOSAKA	Overseas business dept.	Title: Dept. Manager
	Tel: +81-47-346-5215		E-mail: info@hassyukenki.com
Overseas Branches	Vietnam (Hanoi, Ho Chi Minh city)		
Possible Implementation Areas	Worldwide		
Supported Languages	English (e-mail only)		

Business Overview

We are a contractor specializing in the contracting and construction of civil engineering foundation work and building construction.

[Main construction work]

- Cast-in-place pile construction (RCD method, TBH method, CD method, JSHR method)
- Steel pipe pile construction (NS eco-pile method, vibro hammer method, hydraulic hammer direct striking method)
- Obstacle removal work (CD method, BG method)
- Cast-in-place pile construction and obstacle removal construction for height restrictions
- NS stud construction method

[Owned original machine]

RT200SL: Maximum weight 15.3t, Construction diameter Φ1000-Φ2000 mm, Low-height revolving casing machines MPD45, MPD25; SRD14 low-height reverse machines

[Overseas bases]

In 2019, established subsidiary company "HASSYU ASIA CO., LTD." in Vietnam.

Achievements in Japan and Overseas

1997: Construction of Pakse bridge in Lao People's Democratic Republic

2005: Construction plan for TLY piles in Sakhalin

2006: Construction of Malawi bridge in Republic of Malawi

2008-2010: Construction of bridge in the southern corridor between Mali & Senegal

2008: Construction of piles for Sofia subway in Bulgarian Republic (upper image)

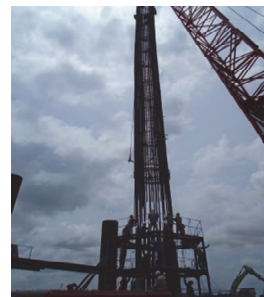
2015: Construction of piles to reinforce Can Tho bridge in Vietnam

2017: Construction of Vam Cong bridge in Vietnam (lower image)

2016: Construction of Kanchpur bridge, Meghna bridge and Gumti bridge in Bangladesh

2020: Construction of My Thuan 2 bridge in Vietnam

We have many other achievements with numerous projects in Japan and overseas.



Work System

We established associated company "HASSYU VIETNAM" in Vietnam in 2010, which trains Vietnamese engineers and workers. Equipment such as CD machines and RCD machines is being brought from Japan and will be based at the HCM Equipment Center. We will expand to third countries with trained Japanese and Vietnamese supervisors.

Revolving casing and reverse circulation combined cast-in-place pile construction method

Pile construction method that combines the advantages of both CD method and RCD method



Image 1 (Bangladesh)



Image 2 (Bangladesh)



Image 3 (Russia)



Image 4 (Russia)

Field	Cast-in-place pile (pier, elevated work, steel tower)	Category	Construction method
Implemented Countries	Russia, Bangladesh, Vietnam		

Technical Overview

[Technical Features]

- Pile foundation method that combines CD method and RCD method (Image 1)
- The pile diameter is compatible with the RT machine, and the rotary table can be placed on the RT machine for pile construction (Image 2).

[Merits of Adopting Technology]

- By using the casing like a stand pipe, it is possible to remove obstacles on the surface layer and perform long-depth excavation at the same time, which leads to shortening of construction period and reduction of construction costs.
- Even on hard ground where the stand pipe cannot be inserted, the casing can be easily press-fitted.
- The long depth casing will have the effect of preventing water, holding the soil, and guaranteeing the verticality with the RCD method.
- Continuous and quick pile construction while removing existing objects and obstacles in the ground (Image 3).
- Not only can be constructed on land, but also on barge in deep river and sea is also possible (Image 4).
- By changing a normal bit to a roller bit or trochoid bit, soft rocks and boulders can also be excavated during long-depth excavation.
- By combining with the JSHR method (BCJ rating-FD0546-02), expanded piles can also be created.

[Contributions to Solving Issues]

- Even in places where there are many obstacles caused by existing objects, natural disasters, dumping, etc., piles of 100 m or more can be driven.
- Excavation can be performed without using Bentonite, making it a construction method that takes the surrounding environment into consideration (depending on the soil conditions).

Conditions for Using Technology

- Applicable range of pile diameter: φ1000 - φ2800 mm, excavation length: - 100 m (Our actual results with RCD method, only 120 m actual)
- In the case of hard ground from the surface layer to the pile bottom, it is necessary to remove the core by a separate auxiliary method.
- Excavation of sand, silt, clay, etc. can be expected to be carried out quickly.
- Soft rocks can also be excavated with roller bits and trochoid bits, but the overall construction speed will decrease.
- Because a drilling fluid plant is required for reverse construction, it is not possible to perform construction in a confined area (construction can be performed if a plant can be secured in the vicinity).

Company	Futaba Corporation	Establishment	1970
Employees	50	Website	http://www.futaba-311p.com/
Address	2-10-15 Tamagawa, Setagaya-ku, Tokyo, Japan		
Contact	Name: Konosuke KAMIDO	Title: Director	
	Tel: +81-3-3707-3511	E-mail: kamido@futaba-311p.com	
Overseas Branches		Ho Chi Minh City, Vietnam	
Possible Implementation Areas		Southeast Asia	
Supported Languages		Vietnamese	

Business Overview

1. Cast-in-place pile construction
2. Ready-made pile construction
3. Underground obstacle removal work

◇Certified Method

[SY Method]

With the SY Method, it is possible to obtain a large bearing capacity by excavating at least twice the diameter of the shaft. Since the amount of excavated soil and ready-mixed soil can be reduced, it leads to a reduction in cost.

[STBC-SR II Method]

The cast-in-place steel pipe concrete pile method is reinforced with a steel pipe that has internal protrusions by welding molding on the part where a large bending moment or shearing force acts, such as the head of a conventional cast-in-place concrete pile.

Achievements in Japan and Overseas

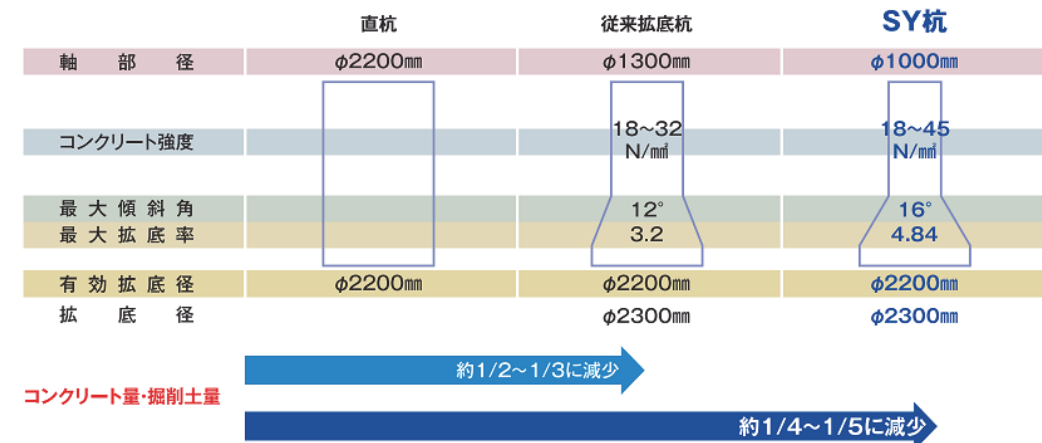
- 2010: New construction project for Japan Coast Guard, Hydrographic and Oceanographic Department
- 2011: Kainan Municipal Hospital New construction project
- 2012: Dairoku Junior High School in Bukyo-ku Reconstruction project
- 2014: Seismic evacuation center construction project, Nuclear Science Research Institute
- 2014: Disaster public housing construction project, Nango, Kesenmuma City
- 2014: Nuclear safety engineering research center construction project, Nuclear Science Research Institute
- 2014: Category 1 urban district redevelopment project in front of Koujiya Station
- 2015: Soka City Hall second building construction project
- 2017: Nagaura office building new construction project (28)
- 2017: Yotsuya Police Station reconstruction project (28), Metropolitan Police Department
- 2020: New construction project, part of Museum of the Imperial Collections development project

Work System

- 10 head office employees, 40 field technicians
- November 2019: Employed Vietnamese engineers (office work)
- January 2020: Employed Vietnamese engineers (site management)

SY Method: Cast-in-place concrete expansion pile

This is a construction method that can obtain a large bearing capacity by excavating the expanded bottom section to more than twice the diameter of the shaft section



Field	Construction work	Category	Construction method
Registration, Awards	BCJ Rating-FDO345-05, The Building Center of Japan		

Technical Overview

[Technical Features]

- A mechanism with a maximum inclination angle of 16° miniaturizes the enlarged bucket. Compatible with small excavators and reaction equipment.
- Manage reliably with the mechanical limit function by the expansion wing restriction stopper.

[Merits of Adopting Technology]

- Since it is possible to excavate more than twice the diameter of the shaft, a large bearing capacity can be obtained.
- With the SY method, the same bearing capacity as a conventional straight pile with a diameter of 2.2 m can be obtained with a shaft diameter of 1.0 m and a bottom expansion section of 2.3 m. In this case, the amount of concrete used for the pile will be reduced to 1/2 to 1/3, the amount of excavated earth and sand will be reduced to 1/4 to 1/5, and the cost of foundation pile construction can be reduced. Since it is possible to excavate more than twice as much, it is possible to obtain a large bearing capacity.

[Contributions to Solving Issues]

- Due to its high versatility, it is possible to utilize earth drilling machines that are already widespread in each country, and the technology can be easily introduced.
- Since no special hydraulic system is required, it can be used at many foundation pile construction sites.

[Video Link]

<http://www.futaba-311p.com/movie/index.html>



Conditions for Using Technology

The size of the bottom expansion bucket that can be used depends on the size of the earth drilling machine used.

Company	Endo-Ecoraise Co., Ltd.	Establishment	April 30, 1975	
Employees	50	Website	http://www.endo-er.co.jp	
Address	6-27-16 Nishiarai, Adachi-ku, Tokyo, Japan			
Contact	Name: Tetsushi SAITO	Department: Construction	Title: Director	
	Tel: +81-3-3897-6292	E-mail: tetsushi.saito@endo-er.co.jp		
Overseas Branches		None		
Possible Implementation Areas		Vietnam		
Supported Languages				

Business Overview
<p>[Standing pile construction]</p> <ul style="list-style-type: none"> Steel pipe (φ900 mm - φ5000 mm) L-Mole Method Steel sheet pilings (Hard soil possible) <p>[Propulsion work]</p> <p>[Liquefaction countermeasure work]</p> <ul style="list-style-type: none"> Groundwater lowering method (Gaiamole Method) <p>[General civil engineering work]</p>
Achievements in Japan and Overseas
<p>2016: Great deep standing pile, Tokyo sewage work station order</p> <p>Pile dia,: φ2590 mm, Depth: 26.2 m, Soil quality: Sandy earth (N≧50)</p> <p>2017: Second-grade river, Disaster recovery, Unosumai floodgate construction</p> <p>Steel pile (IV×15M), hard soil (N≧300)</p> <p>2017/18: Liquefaction countermeasure work, Chiba-order</p> <p>Standing piles: 137 (φ1500 mm - φ2500 mm), Propulsion length: 5,733 m</p>
<div>    </div> <div> <div>φ3000 standing pile</div> <div>Disaster recovery (steel pile)</div> <div>Liquefaction countermeasure work</div> </div>
Work System
<p>We employ 8 technical intern trainees (including specified skilled workers) from Vietnam and Myanmar, also an engineer who graduated from Ho Chi Minh City University of Technology will join us. We intend to expand our business to overseas by developing human resources and technique succession.</p>

L Mole Method (Standing pile)

Vibrationless Low-noise Machine, Standardized work, Reduces construction work period



LMV2000R All-around Machine

Hard bit

Field Sewage system, City Gas, Obstacle removal, Obstacle removal

Technical Overview
<p>[Technical Features]</p> <ul style="list-style-type: none"> Excavation by workers and soil retaining are not needed, enabling safe construction. Excavation and soil retaining are performed at the same time. Press-in machine and excavator are integrated type, and self-propelled movement and installation can be performed easily.
<p>[Merits of Adopting Technology]</p> <ul style="list-style-type: none"> Construction period and construction costs can be reduced since no supplementary construction work is needed. A lot of works are standardized or eliminated compared to conventional construction techniques. Even unskilled workers can build safely with high quality.
<p>[Contributions to Solving Issues]</p> <ul style="list-style-type: none"> Effective for city engineering by using propelled work (reducing road traffic obstacles). Can be used for various types of work, depending on the concept.
Conditions for Using Technology
<ul style="list-style-type: none"> Restricted to less than 6 m in height Soil exploration is needed.

Company	Marutai Doboku Corporation	Establishment	13 December, 1962
Employees	Employees: 130, Workers: 180	Website	https://marutaidoboku.co.jp/
Address	3-5-17 Kitakasai, Edogawa-ku, Tokyo 134-8631, Japan		
Contact	Name: Shizuo TANIMOTO	Technical Division	Title: Manager
	Tel: +81-3-3689-4111	E-mail: gijutu@marutaidoboku.co.jp	
Overseas Branches		Philippines (plan)	
Possible Implementation Areas		All over the world	
Supported Languages		English ,Vietnamese ,Tagalog ,Thai ,Spanish	

Business Overview

1. Pile driving/extraction
2. General civil engineering
3. Sales and repair of construction machines

Our main work is foundation work, consisting of steel pipe sheet driving work and steel pipe pile driving work. We also remove underground obstacles. We have various large machines such as a large crawler crane (500t) and large hydraulic impact hammer. We can handle larger and more diversified construction work with our newest technology.

[Original Technology]

- (1) Noise prevention device which can decrease the noise of driving piles by hydraulic impact hammer: ECOHOUSE "OTONASHIKUN".
- (2) IT construction management device which can make "driving pile management chart", "measurement record of pile penetration amount" on time by using high-speed camera and automatically measuring the penetration amount and rebound amount at the site several tens of meters away from the pile.

Achievements in Japan and Overseas

We started overseas projects from 1971.

We have achieved 47 projects in 27 countries.

2009: Mexico "Manzanillo LNG terminal"

Steel pipe pile $\phi 600 - 1200 \text{ mm}$ Lmax=38 m Qty. 368

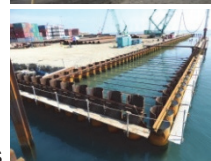
Mexico



2015: Solomon Island "Improvement of Honiara Port facilities"

Steel pipe sheet pile (Wall) $\phi 600 - 900 \text{ mm}$ Lmax=40.5 m Qty. 169

Solomon Islands



2016: Vietnam "Binkain Bridge North South Highway construction (part J1)"

Steel pipe sheet pile (Wall) $\phi 1500 \text{ mm}$ Lmax=63.5 m Qty. 162

Solomon Islands

2016: Bangladesh "Construction of Kanchupur, Meghana, Gumti 2nd Bridges and Rehabilitation of Existing Bridges (Package No. PW-01)"

Steel pipe sheet pile (Wall) $\phi 1000 \text{ mm}$ Lmax=78.0 m Qty. 1125

Bangladesh



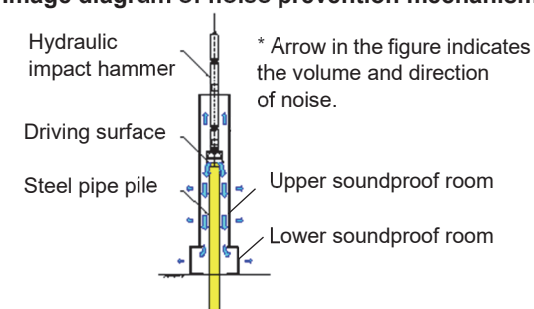
Work System

- We have construction achievements almost all over the world including Asia, Africa, Middle East and Latin America. We can transport pipe driving machines and dispatch Japanese engineers. As of December in 2020, we have projects under construction in Cote d'Ivoire, Bangladesh and Uganda.
- We are planning to establish a branch in the Philippines in 2021.
- In the future we will train the Filipino engineers, and we will promote the localization of branch operation and build up the construction organization with high mobility.

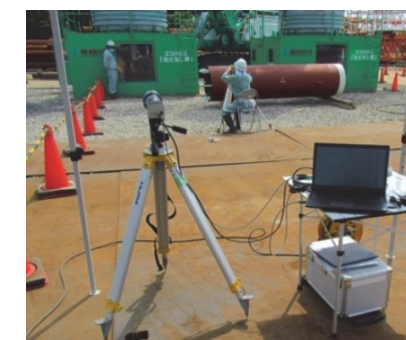
Noise prevention device for pile driving work and construction management by IT

Device that can secure reliable bearing capacity using the impact hammer method without being bound by noise regulations

Image diagram of noise prevention mechanism



Noise prevention device: ECOHOUSE "OTONASHI-KUN"



Sampling Moire camera and PC for control, recording and drawing

Field	Foundation construction	Category	Equipment and systems
Registration, Awards	Noise prevention device: Japan Patent Office: Patent No. 6585755 registered on 13 September, 2019 Center for Environmental Information Science: Technology Development Award in 2019 The Institute of Noise Control Engineering of Japan: Environmental Design Award in 2019 Pile stop management method: NETIS KT-190085-A registered on 26 November, 2019		

Technology Overview

[Technical Features]

1. The effectiveness of the noise decrease is very high (Can be used for construction under the same noise level as the ordinary low-noise method)
2. Installation and removal are easy (Can be used for bulk installation and to ensure the stability only by placing)
3. Condition of pile driving can be confirmed from the outside (Installation of hydraulic impact hammer and stop driving work can be performed from outside of the device)
4. IT construction management device enables drawings to be created on time and cessation of driving work to be confirmed.

[Merits of Adopting Technology]

The "Impact hammer method" needs only a few machines and the process is simple in comparison with other construction methods. It is a very effective method to gain reliable bearing capacity because the resistance of ground penetration can be confirmed through the pile during striking.

Noise prevention device: ECOHOUSE "OTONASHI-KUN" achieves this excellent construction method at construction sites subject to noise restrictions. In addition, the use of an IT construction management device allows the collected and processed data to be utilized on site. This ensures a more reliable and stable foundation.

[Contributions to Solving Issues]

- Construction can be performed in areas with strict noise restrictions near residential areas and hospitals etc. by reducing the environmental load because of the decrease in noise.
- Controlling construction data on time makes it easier to perform process management.
- This system is very suitable not only for the public facilities which need the details of measured values and records but also for huge structures with large quantities of data.

[Video Link]

Overseas construction achievements: <https://marutaidoboku.co.jp/works/14.html>

Video introducing ECOHOUSE "OTONASHI-KUN"
https://marutaidoboku.co.jp/download/aerial_im

ECOHOUSE "OTONASHI-KUN" →
 introduction video QR-code



Conditions for Using Technology

No special conditions.

Company	RONTAI CO., LTD.		Establishment	1957
Employees	125		Website	https://www.rontai.co.jp
Address	3-1-11 Kinda-cyo, Moriguchi-shi, 570-0011, Osaka, Japan			
Contact	Name: Yuji SHINUNE	Overseas Business Department		Title: Department Manager
	Tel: +81-6-6902-9401		E-mail: overseas@rontai.co.jp	
Overseas Branches		Vietnam (Hanoi), China (Dalian)		
Possible Implementation Areas		Vietnam, South East Asia		
Supported Languages		English (e-mail only)		

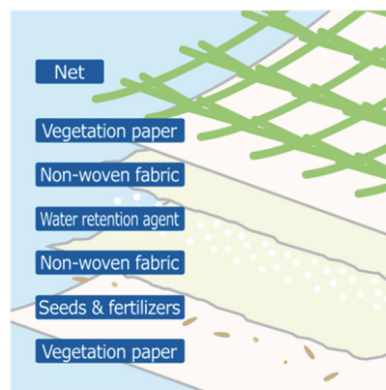
Business Overview

1. Slope greening protection technology
2. Development, manufacturing and sales of slope protection products
3. Design and construction of slope protection technology

[Original Technology]

The proposed product is a sheet consisting of a non-woven fabric that contributes to the drainage of rainwater, a water retention agent and a layer of seeds and fertilizer that contribute to the greening of slopes.

In South East Asia, the precipitation during the rainy season often exceeds 100 mm/h. Even when a rainwater drainage test was conducted with a standard precipitation of 180 mm/h, it showed that our proposed technology helped to drain 85% of rainwater.



Product structure

Achievements in Japan and Overseas

- April 2019: Establishment of representative office in Vietnam
- October 2017: Construction of 300 m² industrial complex in Indonesia
- November 2018: Construction of 600 m² Indonesian church
- September 2019: Construction of 250 m² National landfill in Palau
- February 2020: Widening of 200 m² Indonesia church
- March 2020: Construction of 3,500 m² National landfill in Palau
- November 2020: Slope construction for 200 m² reservoir in Vietnam



Vietnam: Slope construction for reservoir



Indonesia: Construction of industrial complex

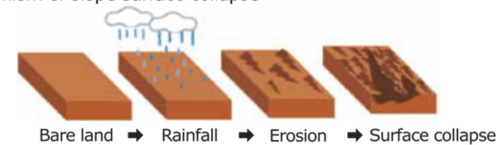
Work System

- Since the construction process is very easy to follow (with procedure manual), local construction worker can perform the job.
- When necessary, instructions can be provided through a video call.

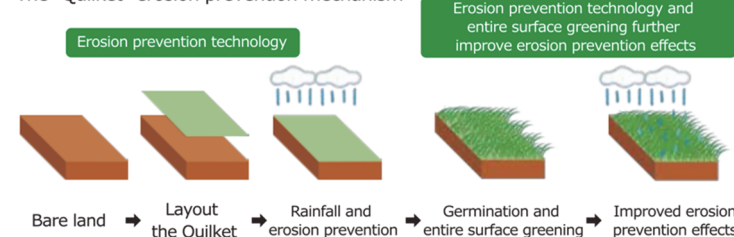
Greening sheet for slope protection

Our technology helps to enhance slope greening and prevent slopes from collapsing by simply covering the surface with a rolled up sheet

The mechanism of slope surface collapse



The "Quiklet" erosion prevention mechanism



Field	Slope planting (Slope protection)	Category	Product
Registration, Awards	NETIS: KK-120016-VE		

Technical Overview

[Technical Features]

Contributes to the greening of slopes and prevention of disasters by attaching sheets that combine seeds and fertilizer

- Drainage function (Non-woven fabric and water retention agent helps to drain water)
- Sediment outflow prevention function (The product absorbs water and becomes heavier, which helps to prevent sediment outflow)
- Greening function (Since our sheets contain seeds and fertilizer, slope surfaces can be greened in around 2 months)
- Simple construction process (Construction can be easily done with only a hammer and scissors)

[Merits of Adopting Technology]

- Since the construction process is very easy and fast, our technology saves much more time compared to the seedling planting method.
- Stable quality since product is manufactured in a factory.

[Contributions to Solving Issues]

- 3 main functions of Quiklet (drainage function, sediment outflow prevention function, greening function) enhances erosion prevention effects, reducing damage due to heavy rain. In this way, our product helps to reduce damage caused by natural disasters.
- Previous construction methods often failed for slope greening, which leads to reconstruction. With Quiklet, the initial cost may be higher compared to previous methods, but there is no need for reconstruction, which helps to reduce the total cost efficiently.

[Construction Process]



Conditions for Using Technology

- Note: Rock greening is not possible
- Seeds used for construction must be examined.

Company	Takino Filter Inc.		Establishment	June 6, 1994
Employees	49		Website	http://www.takino.co.jp/
Address	2-904-16 Hayama, Kudamatsu, Yamaguchi, 744-0061, Japan			
Contact	Name: Kenji FUJII		International Business Division	Title: Section chief
	Tel: +81-8-3346-4466		E-mail: takino-info@takino.co.jp	
Overseas Branches		None		
Possible Implementation Areas		Southeast Asia, West Asia, Central and South America, Oceania		
Available Languages		English, Spanish, French		

Business Overview
<ol style="list-style-type: none"> 1. Manufacture and sales of "Takino Filter" soil conservation and greening materials 2. Investigation of soil and vegetation, and design and construction of "Takino Filter" materials <p>What is the "Takino Filter"?</p> <p>It is a slope protection mat with an erosion control function which was developed with the aim of creating a vegetation base by itself. It mainly consists of non-woven fabric (web) made of randomly entwined polyester short fibers and is reinforced with a polyethylene net. The web with a porosity of 97 to 98% allows the free flow of air and water and protects the soil from any changes in the environment.</p> <p>Currently, the new category of "Construction Method with a Vegetation Mat for Erosion Control" has been established in the public works of Japan and the "Takino Filter" is registered.</p>
Achievements in Japan and Overseas
<p>2012: Indonesia, "Potential Survey for Development and Wide Deployment of Technologies" by Ministry of Foreign Affairs of Japan</p> <p>2013: Indonesia, "Pilot Survey for Disseminating SME's Technology" by JICA</p> <p>2016: East Timor, "Asian Development Bank Road Network Improvement Project" 2,000 m²</p> <p>2017: Indonesia, "GIIC Japanese Industrial Park Slope Improvement Work" 38,500 m²</p> <p>2018-2019: Philippines, "TCP-III Pilot Project Slope Protection Work" by JICA 4,650 m²</p> <p>2018: Honduras, "Landslide Prevention Work in National Road No. 6" by JICA, 2,630 m²</p> <p>2019: El Salvador, "Landslide Prevention Work" by ODA/JICS, 6,000 m²</p>
<div> <div>Before</div> <div>After</div> </div> <p>Restoration of devastated land on Mt. Batur, Bali, Indonesia</p>
Work System
<p>We mainly export our products through Japanese distributors which have overseas sales offices.</p> <p>We provide construction guidance to local contractors, but we do not directly perform construction.</p>

Erosion Control Mat "Takino Filter"

Takino Filter is an erosion control mat that protects the soil from various environmental conditions



Field	Slope construction work	Category	Materials, Products
Registration, Awards	NETIS registered technology (CG-980018-VE) Construction Technology Review and Certificate (No. 0106) Registration of UNIDO Sustainable Technology Promotion Platform (STePP)		

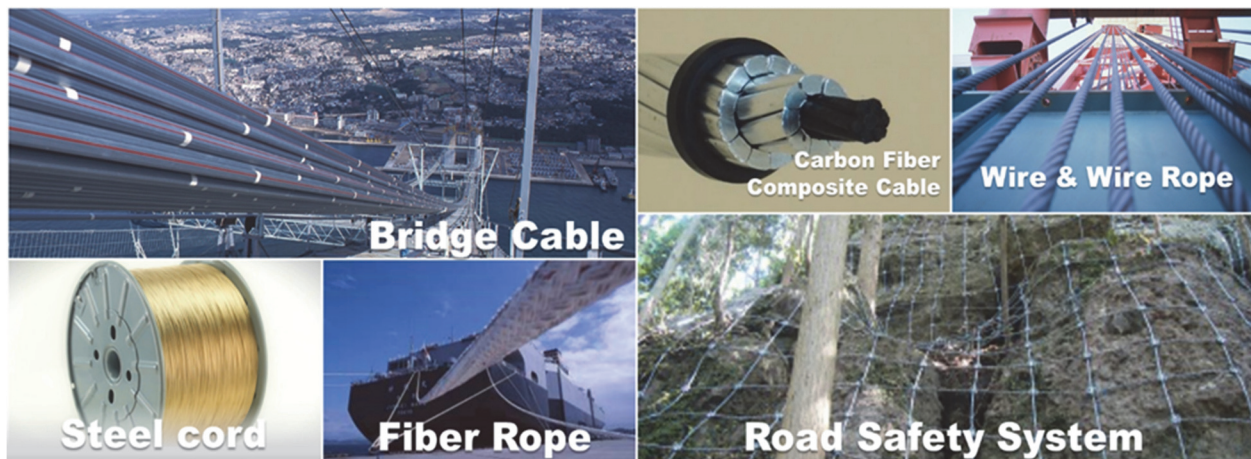
Technical Overview
<p>[Technical Features]</p> <ol style="list-style-type: none"> 1. Prevents slope and soil erosion caused by heavy rainfall and controls muddy water. 2. Heat keeping effect prevents erosion caused by freezing and melting in cold regions. 3. Covering effect of the mat prevents blown sand in high wind areas. 4. Can be applied to the submerged surface of dam lakes etc. 5. Has the water retentivity, preventing soil from drying out. <p>[Merits of Adopting Technology]</p> <ul style="list-style-type: none"> • Because it is a standard product, the quality is uniform and handling is easy. • No spraying machine is required, so anyone can easily install it. • It reduces CO₂ emissions and doesn't create dust, noise or muddy water during construction. • It can be used in combination with slope spraying work. • It enables greening with mainly local plants and leads to permanent greening. • Total cost including maintenance is suppressed, achieving high cost effectiveness. <p>[Contributions to Solving Issues]</p> <p>Because the slope can be protected for a long term after construction, the risk of slope disasters due to environmental stresses such as heavy rains during the rainy season and/or climate change is reduced. Furthermore, greening also contributes to the reduction of CO₂ emissions.</p> <p>[Video Link]</p> <p>Product introduction: https://www.youtube.com/watch?v=TVjmrDybZDI</p> <p>Construction method: http://www.takino.co.jp/manual.html</p>
Conditions for Using Technology
<ul style="list-style-type: none"> • Dynamically stable slope • Soil conditions: Fill soil, cut soil, sandy soil, clayey soil, soil with gravel, various hard soils • Slope angle: If greening is required, the maximum slope angle is 60° (Actual result is 73°) • It is difficult to install on uneven slopes where it cannot be attached close to the surface.



Company	TOKYO ROPE MFG. CO., LTD.		Establishment	April 1887
Employees	1,766		Website	http://www.tokyorope.co.jp/ https://tokyorope-intl.co.jp/
Address	3-6-2 Nihonbashi, Chuo-ku, Tokyo 103-8306, Japan			
Contact	Name: Takuya AKIBA		Engineering Division	Title: Manager of Sales Group
	Tel: +81-3-6366-7789		E-mail: akiba.takuya@tokyorope.jp	
Overseas Branches		USA, Kyrgyzstan, Philippines, Russia, Kazakhstan, China, etc.		
Possible Implementation Areas		All over the world		
Supported Languages		English, Russian		

Business Overview

Tokyo Rope is a leading company in the wire rope industry (wire rope and wire business). Our six major business segments are shown below, which include cable systems for long span bridges and rock fall prevention/snow damage prevention products.



Achievements in Japan and Overseas

Rockfall Countermeasure: Philippines (Client: DPWH), Russia, Kazakhstan etc.

Suspension/Cable Stay Bridge Cable: Turkey "Osman Gazi Bridge" (Izmit Bay Crossing Bridge), Hong Kong "Stone Cutter Bridge" etc.

Carbon Fiber Composite Cable (CFCC): USA Virginia State "Hampton Roads Bridge-Tunnel Expansion Project" (Client: Virginia Department of Transportation), Reinforcement cable for concrete pile and precast concrete deck and girder (under construction)



Work System

We provide a full range of services including design, fabrication, transportation, and supervision for installation. We dispatch our multilingual supervisors all over the world.

1. Rockfall Countermeasure 2. Bridge Cable 3. Carbon Fiber Composite Cable (CFCC)

Civil engineering using cable and wire technology (design, fabrication, installation)



Field	Rockfall countermeasure, bridge cable, reinforced material against salt damage	Category	Material, product, installation
Registration, Awards	Rockfall countermeasure: Philippine DPWH "Blue Book" accreditation Carbon fiber composite cable (CFCC): AASHTO certification		

Technical Overview

[Technical Features]

1. Rockfall countermeasure: Rich and long experience in Japan, variety of products, high quality and performance (long life, low maintenance)
2. Bridge cable: Prefabricated main & hanger cable for Akashi straight bridge and others
3. Carbon fiber composite cable (CFCC): Reinforcing materials used in coastal areas subject to salt damage and cold regions where snow melting agents are used.

[Merits of Adopting Technology]

- High quality product mix (low maintenance & minimum repairs = minimizing Net Present Value)

[Contributions to Solving Issues]

- Utilization of local materials and technology transfer

[Video Link]

https://www.youtube.com/watch?v=Nu7iJGj2HOk&list=PLypNbM48WZ9-n_13oBGXq334qRR7h9Pz1&index=2
https://www.youtube.com/watch?v=p6PK0LWEYAw&list=PLypNbM48WZ9-n_13oBGXq334qRR7h9Pz1&index=4

Conditions for Using Technology

- We propose optimum solution based on site investigation and cost analysis.
- Supervision for installation to achieve total high performance

Company	SANKO CO., LTD. (SANKO Group)		Establishment	1949
Employees	166		Website	https://www.skgr.co.jp/
Address	2-27-10, Higashi-Ohi, Shinagawa-ku, Tokyo, Japan			
Contact	Name: Aijiro OE		Overseas Business Development	Title: Manager
	Tel: +81-3-3761-2111		E-mail: ooe-a@sankogr.co.jp	
Overseas Branches		Singapore, Malaysia (2 Co.), Thailand (2 Co.), Indonesia, Philippines (2 Co.), Vietnam, USA		
Possible Implementation Areas		South East Asia, Africa, Middle East, Eastern Europe, USA etc.		
Supported Languages		English		

Business Overview

The SANKO Group has been evolving with industry, continually taking on challenges and seeking fields not only domestically but also around the world in the over 70 years since establishment in 1949. At present, we are composed of 6 domestic companies segmented by sector and function and 10 overseas companies in South-East Asian countries and the USA, mainly in the engineering field of instrumentation/control systems, electrical facilities and piping, with each company pursuing further sophistication of its own technology/services as a professional. By utilizing synergistically collected group strength, we have provided Global One Stop Engineering from basic planning, procurement, production, system integration and construction to maintenance in various domestic and international industrial fields.

[Business Outline of SANKO Group]

- Engineering of Instrumentation/Electrical facilities for domestic & international plants/factories
- Piping, Equipment Installation
- Engineering & Production of Control Panels/Sampling Equipment
- Supervisory Control and Data Acquisition (SCADA) System Integration
- Instrumentation Maintenance, Calibration of Measuring Equipment
- Production of Fitting/Valve etc.

Achievements in Japan and Overseas

[Establishment of Overseas Affiliated Companies]

- Singapore (1979), Philippines 2 Companies (1992, 2011), USA (1995), Indonesia (1996)
- Malaysia 2 Companies (1998, 2000), Thailand 2 Companies (2000, 2015), Vietnam (2016)

[Recent Major Overseas Construction Experience] * E: Electrical, I: Instrumentation

- Singapore: E & I work for Exxon Mobil large-scale petrochemical plant (Fin. 2017)
- Malaysia: E & I work for semiconductor silicon production plant in Sarawak (Fin. 2013, 2015)
E & I work for gas recovery & reforming plant in Terengganu (Fin. 2015)
I work for large-scale ethylene plant in Johor (Fin. 2019)
- Indonesia: E & I work for PVC raw material production plant in Cilegon, Java Island (Fin. 2016)
- Vietnam: I work for large-scale oil refinery plant in Nghi Son, Thanh Hoa (Fin. 2017)
E work for TTC No.2 50MW solar power plant in Tay Ninh (Fin. 2019)

Work System

- Each overseas affiliate is controlled by a Japanese GM dispatched from the head office, and conducts educational training of local staff, engineers and technicians according to its training program.
- We have mobilized multinational workers ranging from a few hundred to around one thousand for construction projects. The engineers/workers hired for the project are managed by our own database, and we have established a structure that enables us to assign the right people in a timely manner across the group.
- We have conducted educational training prepensely in Japan, using our intracompany transferee system.

Global One Stop Engineering by SANKO Group

We can provide Global One Stop Engineering, from basic planning, procurement, production, system integration and construction to maintenance in various industrial fields

Field	Plant construction work	Category	System
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Technical Overview

[Outline of Main Technologies of SANKO Group]

1. Instrumentation Facility Work

Instrumentation facilities are used to monitor and control process volume (flow, pressure, temperature, level, component etc.) in production runs at plants/factories, and realize optimum production and safe operation. We have a lot of Instrumentation construction experience for overseas plants, including the Middle East and Asia.

2. Electrical / Power Facility Work

We have conducted work (including explosion-proof work, which requires expertise) for substation, distribution facilities, power equipment and lighting facilities for oil / petrochemical / power plants and pharmaceutical / food factories, covering design, procurement, construction, inspection, testing and maintenance.

3. Piping, Equipment Installation Work

We have conducted piping and equipment installation work for LNG/town gas facilities, power plants and industrial gas facilities based on technology/know-how accumulated in work for nuclear facilities for many years. Our factory, which has acquired authentication of the welding control process by the Electricity Business Act, has prefabricated piping with high-quality welding technique/facilities in response to various needs.

4. Control Panel/Sampling Equipment Production

We have produced control panel/sampling & chemical feeding equipment etc., consecutively from design, assembly and factory testing to installation & commissioning after delivery, prioritizing ease of operation & maintenance and utilizing clean room & various function simulation devices.

5. Supervisory Control System Integration

We have conducted system integration in the field of batch process / manufacturing & assembly for pharmaceuticals / fine chemicals / tires / car industry, consecutively from design of supervisory control system consisting of PC, PLC, development of control software, system architecture and commissioning to maintenance. In addition, we have provided validation services according to latest laws/regulations/ guidelines in the pharmaceutical industry.

6. Instrumentation Maintenance / Calibration

Measurement is the principal portion of instrumentation. To maintain quality / safety / stable operation of plant and infrastructure facilities, comprehensive maintenance and calibration of sensors / instruments / analyzers / instrumentation systems are essential. We have regional service hubs around the nation, and a calibration technical center (Kawasaki City), which provides calibration services for instruments/measuring equipment with the nation's premier calibration equipment traceable to national measurement standards.

Conditions for Using Technology

Please feel free to contact us.



Company	Soltec Industries Co., Ltd.	Establishment	1985
Employees	120	Website	http://soltec21.co.jp
Address	2-1-17 Tatsumihigashi, Ikuno Ward, Osaka, Japan		
Contact	Name: Akiko LEE	Business Administration Department	Title: Managing Director
	Tel: +81-60-6757-4550 Tel: +63-977-778-3550	E-mail: lee@soltecvn.com	
Overseas Branches		Vietnam	
Possible Implementation Areas		Vietnam	
Supported Languages		English, Vietnamese, Korean, Chinese	

Business Overview

1. Manufacturing, mounting and piping work for all sorts of plant equipment.
Dust collection equipment, power generation facilities, conveyor facilities, rolling and refining equipment, all sorts of tanks, structures, etc.
2. Environment-related equipment work
Incineration plants, recycling centers, purification plants, sewage - treatment plants, biomass generator equipment, etc.
3. Maintenance for all sorts of plant equipment
4. Worker dispatching, employment placement business (Advanced engineers in Vietnam, Korea)



SOLTECVN - First factory



SOLTECVN - Second factory

Achievements in Japan and Overseas

We can carry out one-stop work from design and manufacturing to mounting and piping work. SOLTEC VIETNAM - a subsidiary is established in 2010. Currently, our production capacity is up to 600 tons per year in Japan and 4,000 tons per year in Vietnam. We have received orders for large-scale projects in Japan and have many construction records for field erection. In Vietnam, our local employees can carry out and we strictly abide by Japanese-style quality, delivery time, and safety. Japan and Vietnam have tied up to provide services unique to the Soltec Group. We have 35 years of experience in manufacturing and field erections in Japan and 10 years in Vietnam.



Photos of achievements and manufacturing in Vietnam

Work System

When the organization was established in Vietnam, Japanese engineers were stationed to guide local engineers. Currently, three Japanese staff (sales, cost management, construction supervision) are stationed locally. We dispatch instructors from Japan as needed for large-scale construction and production projects. Vietnamese employees can now carry out all work from production to construction by themselves. We will continue to dispatch instructors from Japan for a while to improve the level of local engineers. One of our strengths is employing many employees in Vietnam who have three years of experience in Japan.

Plant construction with integrated technology

Provide one-stop service for piping work, mounting and manufacturing of equipment for all sorts of plants.



Achievements of SOLTEC VIETNAM COMPANY: Manufacturing (including tank design), mounting, piping work, etc.

Field	All sorts of plant equipment, environment-related equipment	Category	Design, fabrication, mounting, piping work
Registration, Awards	GANBARU (Vibrant) Small and Medium Enterprises 300 (Organization for Small & Medium Enterprises and Regional Innovation in Japan), Osaka monozukuri spirit, excellent companies in Osaka (Osaka Prefectural Government)		

Technical Overview

[Technical Features]

- Our "integrated technology" based on our entire technology with many achievements enables us to carry out one-stop equipment manufacturing, mounting and piping work for all sorts of plants.
- Piping work, mounting and manufacturing of environment-related equipment (incinerator plants, biomass power generation, sewage - treatment plants, filter plant equipment)
- Plant equipment (Piping work, mounting and manufacturing for a wide variety of plant equipment such as power generating units, chemical plant equipment, steelworks)
- Maintenance work for all sorts of plant facilities.
- By acquiring stamp U and stamp S of ASTM, Soltec Vietnam can also manufacture products related to boilers and pressure vessels.
- We have secured a production capacity of 600 t/year in Japan and 4,000 t/year in Vietnam.
- By increasing the number of design teams and excellent human resources in Vietnam from 2020, we are able to provide design services at a low cost with the design remote lab system.

[Merits of Adopting Technology]

- You can place complete order from design to manufacturing, mounting and piping work.

[Contributions to Solving Issues]

There are many emerging countries that feel nervous about the issues of environment-related equipment such as water supply and sewerage equipment, wastewater treatment equipment or incinerator plants. Our "integrated technology" helps solve these issues.

[Video Link]

https://youtu.be/xe_YUGx6rno

Conditions for Using Technology

None

Company	ITO Corporation	Establishment	May 1929
Employees	287	Website	www.itokoki.co.jp/english/
Address	10-4 Hakodono-cho, Higashiosaka, Osaka, 579-8038, Japan		
Contact	Name: Sakura IWASAKI	Overseas Operation Department	Title: Manager
	Tel: +81-72-987-9020	E-mail: sakura.iwasaki@itokoki.co.jp	
Overseas Branches	Korea (Gyeonggi-do, Jeju), China (Shanghai), Vietnam (Hanoi, Ho Chi Minh), United Kingdom (Buckinghamshire), Myanmar (Yangon)		
Possible Implementation Areas	South Korea, China, Vietnam, Myanmar etc.		
Supported Languages	Korean, Chinese, Vietnamese, English etc.		

Business Overview

1. Manufacturing Gas Supply Equipment (METI Certified High Pressure Gas Equipment Manufacturer) and Disaster Prevention and Mitigation Business
2. Construction and Engineering Business (Special Construction Business Licensed by the Governor of Osaka)

Achievements in Japan and Overseas

- 1965: Constructed our 1st LP Gas filling station with 2 units of 10t bulk tank in Seoul, South Korea. Contributed to the start of domestic production of LP gas in South Korea.
- 1998: Established our 1st overseas subsidiary in Anyang, South Korea. Our products were adopted by pressure regulating stations for city gas in the Nagano Winter Olympics, Japan.
- 2001: Established a subsidiary in Japan to expand our overseas business. Participated in the District Development .Project in Ho Chi Minh, Vietnam and started designing LP Gas supply equipment and facilities.
- 2003: Established a sales company in 2003, and a manufacturing factory in 2005, both in Shanghai, CHINA.
- 2006: Designed and constructed LPG facilities for a new terminal at the Tan Son Nhat Int'l Airport in HCM, Vietnam.
- 2007: Incorporated our local liaison office in Ho Chi Minh, Vietnam.
- 2010: Sold LPG supply equipment for a venue at the Shanghai World Expo in Shanghai, China.
- 2015: Contracted and installed LPG equipment for a new terminal of the Noi Bai Int'l Airport in Hanoi, Vietnam. Delivered LPG supply equipment for the ICHTHYS LNG Project in Australia.
- 2016: Established a joint venture company in Yangon, Myanmar.
- 2018: Applied LPG supply system at the Pyeongchang Winter Olympics in South Korea.



Our Lineup

Work System

- In Vietnam, we have 1 or 2 Japanese technical sales staff stationed and 37 local staff. In Myanmar, 1 Japanese technical sales representative is stationed. Our experienced staff can flexibly handle projects in neighboring countries.
- We provide excellent service for residential area distribution using LPG low pressure system, for commercial facilities with equipment offering a high level of safety, and for complexes and difficult industrial facilities which cannot be handled by local agencies. We will support you to enable a safe and reliable supply of gas.

Sustainable LP Gas & Natural Gas System with Low Environmental Burden

Highly Efficient, Advanced Safety, and Eco Friendly LP Gas & Natural Gas Supply System



LPG Supply System
50t Tank 1,500 kg/h Air-heating Vaporizer



LPG Supply System
25t Tank, Air-heating & Electric Vaporizer

Field	LP Gas & City Gas Natural Gas Supplying System	Category	Manufacturing & Design
Registration, Awards	1995 Grand Prize by Ministry of Economy, Trade and Industry. 1996 Good Company Award, sponsored by the Medium and Small Business Research Institute "Corporate Excellence Prize" 1999 The High Pressure Gas Safety Institute of Japan, Osaka "Distinguished Service to Safety Award" 2008 The 300 of "Japan's Vibrant Monozukuri (Manufacturer) SMEs by Ministry of Economy, Trade and Industry. 2005, 2008 The Japan Gas Associations "Technical Grand Prize" 1998, 2000, 2003, 2009, 2010, 2016, 2020 "Technical Prize" 2011 The World LP Gas Association Global Technology Conference "Technical Grand Prize" 2013 The World LP Gas Association Global Technology Conference "Technical Grand Prize" Runner Up 2014 Higashi Osaka Monozukuri (Manufacturing Engineering) Award "Grand Prize" 2020 Advanced Cogeneration and Energy Utilization Center Japan The Cogeneration Award "Technical Prize"		

Technical Overview

[Technical Features]

We design and construct LP gas and city gas natural gas supply systems for midstream and downstream based on Japanese high safety standards. Utilizing our experience in Japan and overseas markets, we can flexibly respond to local conditions and supply LP gas to cover residential buildings and/or shopping malls from LP Gas vaporization & regulation facilities in one place through pipelines. For factories, we support the improvement of existing supply systems or conversion from coal or heavy oil to LPG or NG, and suggest unique solutions to help reduce carbon emissions using our eco-friendly products such as our air-heating type vaporizers for LP gas (the ITO eco Rizer).

[Merits of Adopting Technology]

- Reduce consumer's risk of danger caused by changing of cylinders. Our "automatic changeover regulators" and other innovative products enable the changing of cylinders without cutting off the LP gas supply.
- We can design and install an automatic shut-off system that prevents gas leakage even after an accident or natural disaster using advanced safety devices, and a gas-leakage centralized monitoring system.
- We optimize design in accordance with local conditions to ensure a safe and reliable supply. Follow-up services such as periodic inspections are also available.
- Reduce CO₂ emissions and running costs in factories by introducing air-heating type vaporizers.

[Contributions to Solving Issues]

Ensuring universal access to reliable, sustainable, and modern clean energy services.

Conditions for Using Technology

Please feel free to contact us.

Company	TAMADA CORPORATION	Establishment	1950
Employees	278	Website	https://www.tamada.co.jp/
Address	Ha 61-1 Muryojimachi, Kanazawa, Ishikawa 920-0332, Japan		
	Name: Takamitsu AKAIKE	Overseas R&D Division	Title: Manager
	Tel : +81-3-5401-3689	E-mail: takamitsu_akaike@tamada.co.jp	
Overseas Branches		Hai Phong Province, Vietnam	
Possible Implementation Areas		Vietnam, Southeast Asia	
Supported Languages		English, Vietnamese, Chinese	

Business Overview

1. Design and manufacture of underground storage tanks and fire cisterns *No. 1 domestic share (70%) for S&F double wall tanks
2. Design and construction of hazardous substance facilities
3. Underground Tank Interior Lining (extend the useful life of old tanks)
4. Statistical Inventory Reconciliation for underground storage tanks
5. AQUA in PIT, AQUA in Angel (Earthquake Resistant Water tanks for Fire protection & Drinking Water Purposes)
6. Maintenance & Inspection of underground storage tanks and tank trucks
7. Overseas business (licensing of technology, OEM, delivery of imports, etc.)

Achievements in Japan and Overseas

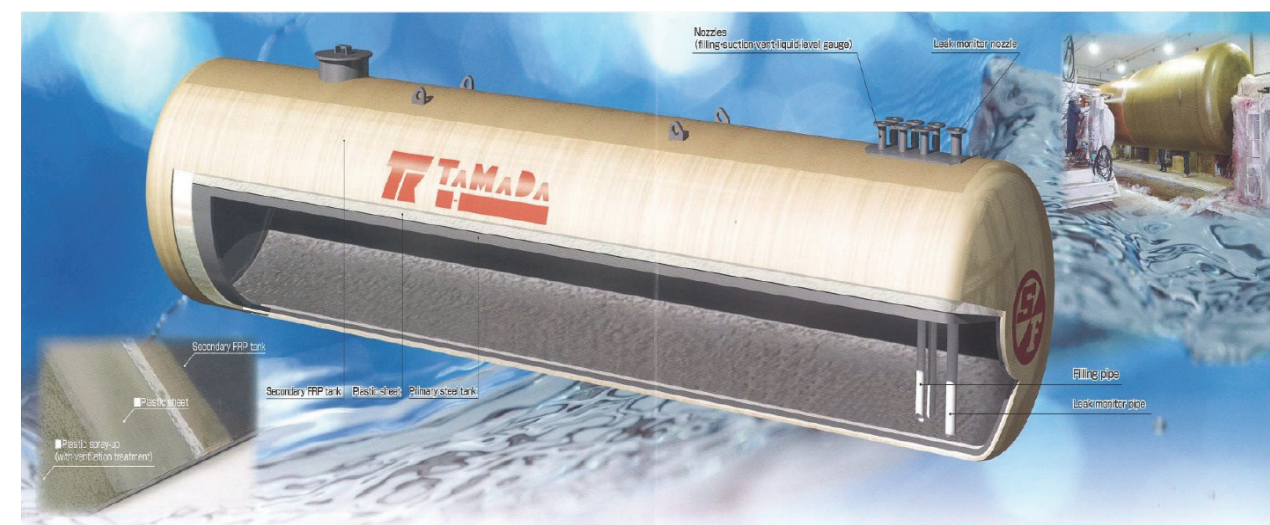
1. In 2012 the Japan International Cooperation Agency (JICA) conducted the SDGs Business Model Formulation Survey with the Private Sector for Hazardous Material underground storage tanks (in Vietnam)
2. In 2013 JICA conducted The Knowledge Co-Creation Program for the Socialist Republic of Vietnam, a pilot survey for disseminating small and medium enterprises technologies for SF double shell tanks to avoid leakage of hazardous materials.
3. In 2013 we established a local subsidiary in Vietnam and opened a factory in 2015 to deliver products to Vietnam, Japan, and third countries.
4. In 2018 1st Japan Construction International Award (MLIT) SMEs category
5. Delivery of SF double wall tanks for gas stations and factory facilities in Vietnam
6. Delivery of chemical storage tank (double wall tank) to the Philippines
7. Contracted manufacturing of various plate products (tank, ducts, hoppers, stands, etc.)
8. Licensing of technology (to Thailand, Malaysia, China, Taiwan)

Work System

Our technician will be on hand and provide installation guidance when the tank is installed.

SF Double Wall Tank

Hazardous material storage underground tanks with an emphasis on safety, quality and economy



Field	Oil Construction	Category	Product
Registration, Awards	JIS Q 9001:2008 (ISO9001:2015)		

Technical Overview

[Technical Features]

<SAFETY>

1. 1 Seamlessly laminating the FRP layer of the outer shell consists of a unique construction method (multilayered method) which makes up for the weak point of FRP that has seams with the ordinary construction method, creating a solid underground tank.
2. No. 1 construction record in the industry (in Japan) thanks to outstanding strength of a steel tank, with no tanks damaged by the Great Hanshin-Awaji Earthquake.
3. Pressure gauge is installed and kept in place until the end of tank installation to enable accidents to be instantly detected during construction.
4. Can also be used to store fuel containing alcohol.
5. Leakage monitor (leakage detection device) detects minute leaks in the tank and provides instant notification with a buzzer.

[Merits of Adopting Technology]

Since the tank itself has a function to detect leaks, there is no need to install a pit room, and construction costs and period can be reduced.

[Contributions to Solving Issues]

It is possible to prevent soil contamination by preventing the fluid leaks from the underground tank.

[Video Link]

https://www.youtube.com/watch?v=yQv3meo_JxE&t=6s

Conditions for Using Technology

There are no qualifications. Please feel free to contact us if you have any questions.

Company	JESCO Holdings, Inc.		Establishment	August 1970
Employees	584		Website	https://www.jesco.co.jp/en/
Address	Shin Nakano Building, 4-3-4 Chuo, Nakano-ku, Tokyo 164-0011, Japan			
Contact	Name: Masayuki NUMAI	Strategic Corporate Planning Office		Title: Director
	Tel: +81-3-6382-7123		E-mail: info@ml.jesco.co.jp	
Overseas Branches		Vietnam (Ho Chi Minh , Danang , Mekong Delta , Hanoi), Malaysia (Kuala Lumpur), Singapore		
Possible Implementation Areas		Vietnam (Ho Chi Minh City, Da Nang City, Hanoi City, Long An Province)		

Business Overview

We are an EPC Contractor (Engineering, Procurement and Construction) engaged in the construction of electrical and wireless communication facilities in Japan and Vietnam, providing one-stop integrated solutions from consulting, engineering, cost control and construction to management of construction and maintenance. Our main businesses are described below.

(Domestic) Renewable energy such as solar power, mobile communication systems, wireless networks, electrical equipment construction, plant-related construction, power transmission network construction, and high-voltage power generation and transformation equipment construction

(Vietnam) Various engineering and cost integration services (Design soft BIM has been introduced), electrical equipment work for Vietnam international airports, disaster prevention radio-related works, solar power generation, highway ITS work, high-rise condominiums (electrical equipment, air conditioning, water supply and drainage and fire-fighting systems)

Achievements in Japan and Overseas

JESCO ASIA JSC was established as a subsidiary in Vietnam in 2001. Headquarters were established and branches were set up in Da Nan, Hanoi, and Mekong. In 2014 HOA BINH Group's facility construction company was established as JESCO HOA BINH JSC (JHE) through an M&A by the JESCO Group.

In addition to the design, construction, and construction management of several international airport electrical facilities funded by Japanese ODA (Noi Bai, Tan Son Nhat, Long Tan), the company is expanding its business domain to include disaster prevention radio-related construction and solar power generation. In Ho Chi Minh City, the company boasts a high market share in the construction of electrical, air conditioning, water supply and drainage, and fire extinguishing systems for high-rise condominiums.

1. Noi Bai International Airport: Design, construction management, and electrical equipment work
2. Hue Province: "Emergency operation and flood management of dams using a water damage management information system"
3. High-rise condominiums: Electrical equipment, air conditioning, water supply and drainage and fire fighting systems.



1. Noi Bai International Airport



2. Disaster Prevention Map



3. Flora Mizuki Project

Work System

JESCO ASIA JSC Ho Chi Minh Head office, Da Nang Branch, Mekong (Long An)Branch - Total number of employees: 166

JESCO HOA BINH ENGINEERING Ho Chi Minh Head office – Number of employees: 168

JESCO CNS Vietnam Hanoi – Number of employees: 23

EPC Contractor for Electrical and Wireless communication facilities

**Technical capabilities cultivated through 20 years of experience in Vietnam
(Design and material costing, management of construction and construction)**



JESCO ASIA JSC Design office



ACECOOK VIETNAM
Solar power generation equipment



JHE Field office
*The screen is a 3D-BIM blueprint.

Field	Construction, maintenance	Category	Construction procedure
Registration, Awards	2018 1st JAPAN Construction International Award (Minister of Land, Infrastructure and Transport Prize), 2016 Engineering Achievement Award (Vietnam, Noi Bai International Airport), 2018 High quality construction award (Vietnam Ministry of Construction), 2019 First-class construction-related ability certificate (Vietnam Ministry of Construction)		

Technology Overview

[Technical Features]

- We are able to provide consistent services from design and cost estimation of construction, construction management, and maintenance.
- The design and cost estimating departments in Japan and Vietnam can be connected through a DX-based web conference system, creating a unified virtual space.

[Merits of Adopting Technology]

- High quality, low cost, and speedy design and cost estimation through the use of offshore resources (Vietnam)
- Total management from cost estimation to construction is possible by adopting the latest BIM technology.

[Contributions to Solving Issues]

- Advanced engineers can be trained by the JESCO Academy, an in-house education system utilizing the internet.
- Contribution to the efficient development of social infrastructure through our experienced construction management technology.
- Expansion of employment of local high-level engineers in Japan (through the use of JESCO Expert Agent (JEA), the Group's recruitment agency for foreign engineers)

[Video Link]

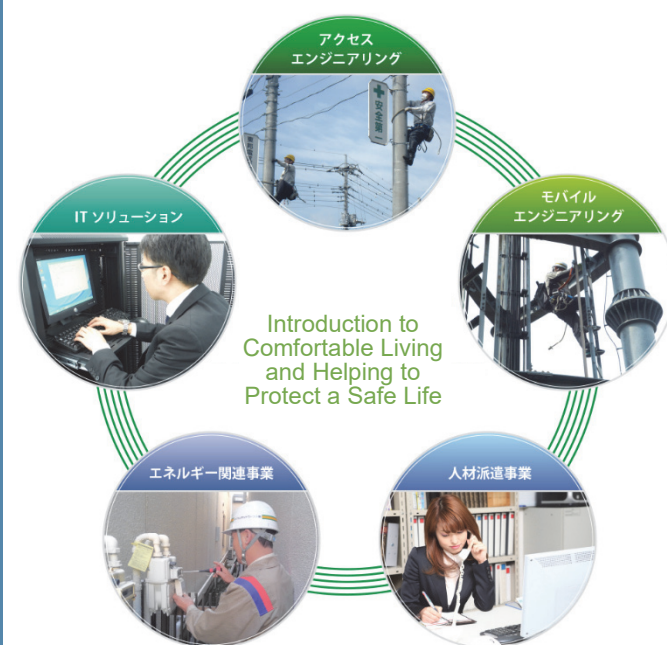
- Infrastructure improvement : Gateway to the sky Noi Bai International Airport in HANOI
<https://www.jesco.co.jp/en/project/story07.html>
- Three key people who led a large-scale project to success
<https://www.jesco.co.jp/ja/project/story06.html>
- JESCO has provided Vietnam with Japan's high quality EPC business through our localized power
<https://www.jesco.co.jp/en/project/story03.html>

Conditions for Using Technology

None

Company	Yuicom Networks Co., Ltd.		Establishment	April 2005
Employees	335		Website	http://yuicom.net/
Address	4-29-6 WIS Building 4F, Nishi-Shinjuku, Shinjuku-ku, Tokyo, Japan			
Contact	Name: Ryo SANO		Wide Area Engineering Division	Title: General Manager
	Tel: +81-03-3373-3911		E-mail: r_sano@yuicom.net	
Overseas Branches		None		
Possible Implementation Areas		Please contact us		

Business Overview



As a partner of telecommunications carriers, we are working to build systems for IOT-related equipment that will lead to the future.

- 1. Access engineering**
Build a network using optical fiber cables.
- 2. Mobile engineering**
Comprehensive construction work, from consulting to construction and maintenance of mobile phone base stations.
- 3. IT Solutions**
We will make full use of the various technologies and networks that have been cultivated through the construction of communication facilities up to now to promote initiatives for higher layers.
- 4. Energy-related business**
Construction and maintenance of communications infrastructure facilities provided by gas suppliers.
- 5. Temporary staffing services**
We dispatch professional engineers who are well versed in each field with high skills.

Achievements in Japan and Overseas

[Results in Japan]

- Construction of wired transmission lines for telecommunications carriers
- Construction of terminal equipment for communication services
- Construction of radio transmission lines for telecommunications carriers
- "IOT" Device System Construction

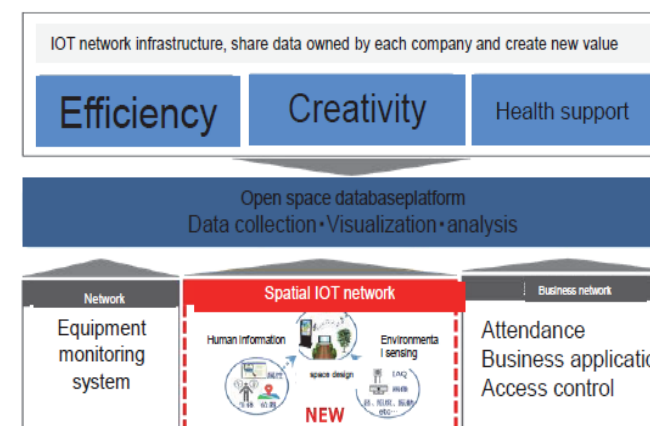
Work System

For the above, we can provide all construction systems.

We also operate a temporary staffing business, so we can dispatch employees overseas upon request.

Data collection technology by integrating sensors and communications

Technology that collects and accumulates data of working people
by fusing communication and sensors



[Point 0 Marunouchi]



Field	Providing office space where you can work more efficiently	Category	Communication environment construction
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Technical Overview

[Technical Features]

As part of the work to build workspace "Point 0 Marunouchi" in an office building in central Tokyo that incorporates multi-spatial content under the theme of "More efficient office space", we undertook the development of a communication environment and the installation of IoT devices under the umbrella of a certain telecommunications company.

In addition to air conditioning, lighting, sound, fragrance, furniture, and other equipment, the workspace is designed to suit a variety of office environments, collecting data on the comfort, productivity, and health of the people who work there, and verifying the effectiveness of content and creating new content. The workspace is designed to suit a variety of office environments by collecting data on the comfort, productivity, and health of the people who work there, and not only the equipment such as air conditioning, lighting, sound, fragrance, or furniture. We also plan to use feedback from workspace users to enhance spatial content.

■ Main content

1. Automatic interlocking service for air conditioning, lighting, and security linked with location information in the space
2. Meeting room where discussions can proceed smoothly with voice-based sentiment analysis and "scent spraying"

[Merits of Adopting Technology]

We select and propose various application systems that are suitable for local requests (monitoring systems that utilize sensors, systems that use cameras with high functionality and learning functions, etc.)

[Contributions to Solving Issues]

We will proactively administer and teach you communication and sensor fusion facility technology for local telecommunication engineers.

Conditions for Using Technology

We can propose applied technologies that integrate communication and sensors.

Company	I.B. Technos Co., Ltd.	Establishment	August 1975
Employees	300	Website	https://www.ibtechnos.co.jp
Address	3-36-3 Daita, Setagaya-ku, Tokyo, Japan		
Contact	Name: Motohide USUKURA	Business Strategy Office	Title: Director
	Tel: +81-3-5931-3331	E-mail: motohide.usukura@ibtechnos.co.jp	
Overseas Branches	None		
Possible Implementation Areas	Vietnam, Indonesia and other ASEAN countries		
Supported Languages	English		

Business Overview

[Centralized monitoring system for office buildings / commercial buildings / factories / other facilities]
Total business solutions from design, construction management and maintenance, to software development of automated HVAC control systems.

Notices:

- Support for devices regardless of manufacturer
- Our product line consists of the following open system monitoring solutions:

1.	IB-VISION	More than 10,000 points can be monitored and controlled. The devices used will not be discontinued, so end of life updates are not necessary.
2.	IB-OPEN	The monitoring devices can be remotely monitored and operated regardless of manufacturer. There is no need to modify software running inside existing systems.
3.	Cloud-based energy monitoring	Non-invasive wireless energy sensors send data to the cloud and the data can be automatically visualized in the desired format.
4.	Other solutions	We also propose construction of systems other than our own products to meet customer requirements. In particular, capacity management solutions for HVAC systems are effective in areas prone to power outages.

[Building management and energy efficiency projects]

In addition to facility management, we provide energy efficiency diagnostics and consulting services, local government reporting form preparation services, and government subsidy advice services. We are a registered carbon emissions trading verification institute in Tokyo and Saitama Prefecture, and make use of considerable experience and expertise to ensure high quality, appropriate verification.

Achievements in Japan and Overseas

- We usually work under contract to subcontractors to construct / start up automatic HVAC system control throughout Japan from government offices, multi-tenant commercial buildings, commercial facilities and schools to factories. In particular, we have many years of experience in cleanrooms for semiconductor manufacturing.
- We use our own centralized monitoring system to perform operations management. It is an open system and scalable to accommodate any hardware regardless of manufacturer / model, and can also be used for integrated monitoring.
- We employ I/O devices that manufacturers do not discontinue, therefore there will be no need to replace all connected devices due to the discontinuation of some devices.
- To date, we have focused on doing business domestically, however as our parent company Totech Corporation has a branch office in Jakarta, we believe we will be able to expand into Indonesia and deliver our services smoothly.

<https://www.totech.co.jp/en/company/group/>

Work System

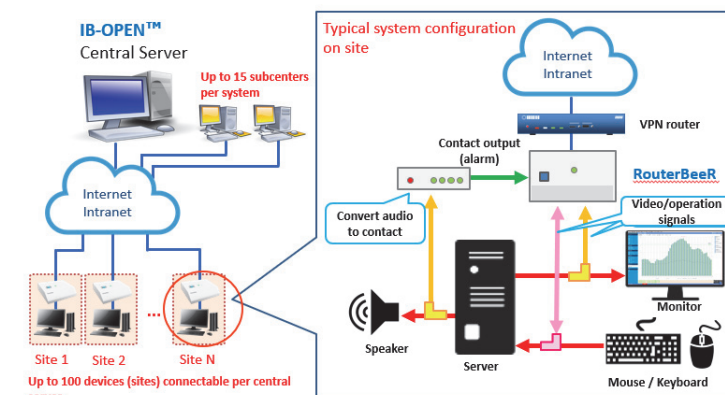
We are able to send our engineers to the site while requesting Totech Indonesia to send staff which will work together. We aim to increase the number of locally hired engineers in the future.

Centralized Monitoring System that Provides Sustainable Comfortable Space

Highly Scalable Open Monitoring System

IB-OPEN – System Configuration

IB-OPEN™ Basic System Configuration



Wide Area Monitoring System IB-OPEN

Field	Facility Management (energy / wide area)	Category	System
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Technical Overview

[Technical Features]

<IB-VISION> is an open monitoring system that supports connections with any vendors' devices as well as smooth future device replacement. We have introduced and operated the system at nearly 300 sites.

<IB-OPEN> allows operations management of multiple systems (regardless of vendor) over a wide area from a single site via the internet (see drawing). We have installed the system for around 10 customers, and some of them manage operations on their own during the daytime while delegating the task to us after hours.

[Merits of Adopting Technology]

<IB-VISION>

- It can be installed at a lower cost compared to large companies. Even in cases where it takes a long time to install the system, end of life device updates due to discontinuation are not necessary.
- It collects signals as a hub and controls devices regardless of manufacturer across multiple areas.

[Contributions to Solving Issues]

<Capacity Management> allows HVAC and lighting to be automatically controlled according to priority during peak hours within the contracted power, contributing to energy management and efficiency.

<IB-OPEN> enables centralized operations management of facility monitoring devices regardless of vendor from a single site, helping reduce personnel.

[Video Link]

<https://www.ibtechnos.co.jp/product/>

Conditions for Using Technology

- IB-OPEN requires an internet connection.
- As precision equipment is used, the installation environment needs to be properly maintained.

Company	KOKEN BORING MACHINE CO., LTD.		Establishment	1947
Employees	230		Website	https://www.koken-boring.co.jp/en/
Address	Mejiro Nakano Building 1F, 2-17-22 Takada, Toshima-ku, Tokyo, Japan			
Contact	Name: Kazuyoshi MORIYAMA		Engineering Division	Title: Deputy Section Chief
	Tel: +81-3-6907-7513		E-mail: moriyama-k@koken-boring.co.jp	
Overseas Branches		None		
Possible Implementation Areas		Worldwide		
Supported Languages		English, French, Tamil (India)		

Business Overview

We are the only listed company (JASDAQ) among boring machine makers. We can provide one stop solutions since we design, manufacture, sell, construct, and maintain a wide variety of boring machines. There are special methods of construction that only we can do, and have obtained many patents.



Achievements in Japan and Overseas

We provide boring machines, technical guidance, and construct boreholes and waterworks around the world.



- Mali:
- Water supply facility
 - Borehole construction



- Malawi:
- Water supply facility
 - Borehole construction
 - Renovation of borehole



- El Salvador:
- Machine provision (Disaster prevention)
 - Technical guidance



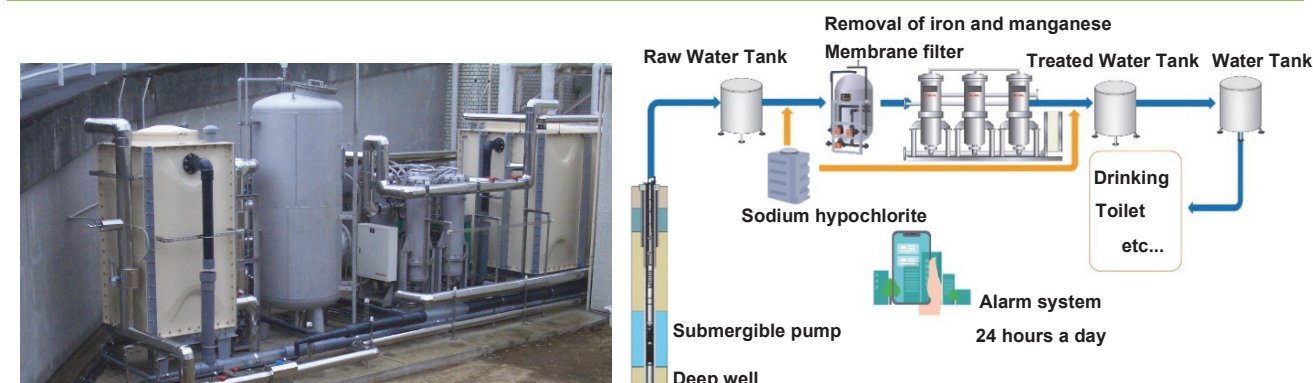
- Pakistan
- Machine provision (Deep well)
 - Technical guidance
 - Technical guidance

Work System

- Japanese engineers and Indian engineers are in charge of groundwater development.
- In the case of construction, several engineers and transport machines will be dispatched from Japan.
- Scheduled to open a branch office in Tamil Nadu, India

Ground Water Purification Plant (Remote Monitoring Type)

Remotely monitored and controlled plant purifies groundwater and enables standard water quality, stable water supply and the reduction of water charges



Ground water plant

Ground water purification flow diagram

Field	Groundwater development, Groundwater purification	Category	Equipment, system
Registration, Awards	Letter of appreciation from residents of Ishima, Tokushima (2010)		

Technical Overview

[Technical Features]

- Taking advantage of the characteristics of the manufacturer, we select the most suitable machine for the site from a wide variety of boring machines.
- Fully automatic operation for normal water sampling and membrane cleaning.
- An alarm system using IoT automatically notifies the person in charge of an emergency 24 hours a day.
- Compact design according to the location of the installation

[Merits of Adopting Technology]

- Total support from water well drilling to purification plant installation and maintenance.
- Water charges can be reduced.
- Remote monitoring technology ensures quick response in case of trouble
- Significant space saving compared to conventional equipment.

[Contributions to Solving Issues]

- Even if the existing water supply is cut off, groundwater can be supplied in a stable manner, enabling factories and hospitals to continue operation.
- We can provide safe and secure water to residents of areas with contaminated groundwater.
- The plant capacity can be set according to the customer's request, taking into consideration the pumping capacity (groundwater volume) of the well.

Conditions for Using Technology

- It is suitable for businesses (factories, hospitals, hotels, etc.) who want to use water with standard water quality.
- It is suitable for businesses that use a lot of water every month which are burdened by water charges.
- It is necessary to conduct groundwater exploration before construction to determine whether this system can be installed.
- Purification of surface water such as river or lake water is not possible.
- Drainage is the responsibility of the business operator.

Company	Daiken Co., Ltd.	Establishment	1974
Employees	38	Website	http://www.d-ken.jp
Address	2-9-12 Minamisho, Sawara-ku, Fukuoka, 814-0031, Japan		
Contact	Name: Kazutoshi OKAMOTO	Land Management Division	Title: Leader
	Tel: +81-92-851-3900	E-mail: okamoto@d-ken.jp	
Overseas Branches	None		
Possible Implementation Areas	Vietnam, Laos, Indonesia		
Supported Languages	English (e-mail only)		

Business Overview

We have received a total of 24 awards from the Ministry of Land, Infrastructure and Transport, and 31 of our 38 employees are technical experts.

- (1) Compensation Consultant: Land surveys, land appraisals, property surveys, machine tool surveys, business compensation, special compensation, business losses, compensation method examination, compensation explanation, business certification, application for adjudication
- (2) Construction Consultant: Roads, rivers, sand/mud control, structures, intersections, bridges, water supply and sewerage systems, agricultural engineering, parks, biotopes, residential land development, development permit application, various types of construction management, environmental assessment
- (3) Residential Development Division: Developer, real-estate transactions, planning, management, builder
- (4) Survey Division: Sites, settlement, depth, GPS
- (5) Geological Surveys: Machine boring, lab tests
- (6) Construction Division: Design, management

[Original Technology]

- (1) "Tametotto" tank that stores large volumes of rainwater while purifying it.
- (2) "NCZ Method" which creates robust manmade foundations and underground spaces.

Achievements in Japan and Overseas

Track Record for "Tametotto" Underground Rainwater Storage Tanks:

- (1) May 2012: "Ogiura Garden Suburb" 18-unit residential complex developed by Daiken in Itoshima, Fukuoka
Storage volume: Approx. 122t x 1 tank, Application: Water for flushing toilets, watering, washing cars, Users: Approx. 50 persons
- (2) June 2014: UN Habitat "Water for Life Project" in Laos
Storage volume: Approx. 100t x 2 tanks, Application: Drinking water, Users: Approx. 600 persons
- (3) May 2017: UN Habitat "Women's Facility Construction Project" in Laos
Storage volume: Approx. 150t x 1 tank, Application: Drinking water, Users: Approx. 200 persons
- (4) January 2018: UN Habitat "Pilot Project" in Vietnam
Storage volume: Approx. 100t x 1 tank, Application: Watering of plants
- (5) September 2019: UN Habitat "Kalobeyei Refugee Camp" in Kenya
Storage volume: Approx. 100t x 1 tank, Application: Drinking water, Users: Unknown
- (6) 2020 (Planned): Installation of 4 tanks planned in Indonesia by Ministry of Foreign Affairs "N Link" NGO Cooperation Grant Aid Project

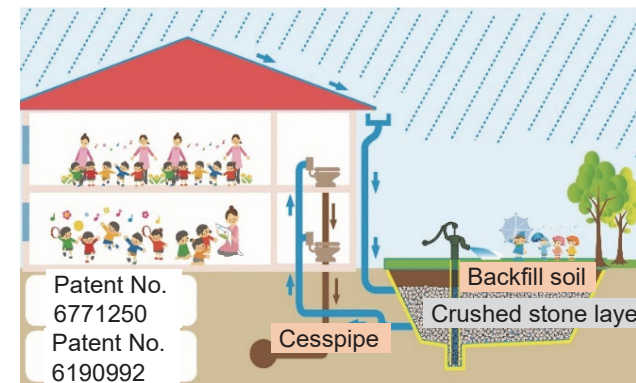
Work System

Overseas Construction Track Record (100 ton class)

- (1) Two Japanese engineers dispatched, built by 7 – 10 local workers.
- (2) Almost no materials or equipment needs to be brought from Japan, and local materials and heavy machinery is used to complete work in about one week.

"Tametotto" Underground Rainwater Storage Tank

Easily built tank that stores rainwater with drinking water quality for various types of uses



Structure of "Tametotto"
Rainwater is collected on the roof and stored in the tank with a crushed stone layer. It can be used to flush toilets and with a hand pump in a disaster.



Photo of work for "Tametotto" in Kakuma Refugee Camp in Kenya (Sept. 2019)

Field	Underground water storage tanks, regulating ponds	Category	System
Registration, Awards	Patent No. 6190992, Patent No. 6771250 Trademark registration (Overseas): Int'l Reg. No. 1499968, (Domestic): No. 6172501		

Technical Overview

[Technical Features]

- (1) Enables large volume of rainwater to be stored at a location in close proximity.
- (2) Rainwater can be purified to drinking water level quality. When dirty water passes through crushed stone, it is cleaned by contact sedimentation, absorption by microorganisms and oxidative decomposition.
- (3) Low construction costs.
- (4) Easy maintenance after construction.
- (5) Can be used as a park, parking lot, playground or other purpose after construction underground.
- (6) Can be used with a hand pump in a disaster.
- (7) Controls outflow during heavy rainfall (regulating pond function).
- (8) Contributes to SDG Goal 6 "Ensure access to water and sanitation for all"

[Merits of Adopting Technology]

- (1) Short construction period
- (2) Materials and equipment that can be locally obtained are used
- (3) Local workers can perform work since no special construction capabilities are required

[Contributions to Solving Issues]

- (1) Enables water source to be secured in countries with water supply problems (insufficient water during dry season, contaminated wells, etc.)
- (2) Can be more quickly built and at a lower cost near residences compared to dams as a method to secure water source, and cost of water purification plant/piping etc. is eliminated
- (3) Effectively controls water outflow in the event of torrential rain (regulating pond function)

[Video Link]

Pamphlet: <http://www.d-ken.jp/tank.html> Introduction video: <http://www.d-ken.jp/movie.html>

Conditions for Using Technology

- (1) Confidentiality agreement with local construction company is required
- (2) Collection of data for installation location (rainfall, etc.) and region in which water distribution rules can be proposed after installation
- (3) Injection of microorganism activator as necessary

Company	Kyowakiden Industry Co., Ltd.	Establishment	1948
Employees	487	Website	https://www.kyowa-kk.co.jp/
Address	10-2, Kawaguchi-machi, Nagasaki-shi, Nagasaki, 852-8108, Japan		
Contact	Name: MATSUZONO	Overseas Business Division	
	Tel: +81-95-848-9106	E-mail: info_overseasbiz@kyowa-kk.co.jp	
Overseas Branches		China (Shenzhen), Vietnam (Ho Chi Minh city, Ving long city)	
Possible Implementation Areas		China, Vietnam, Taiwan, other Southeast Asia area	
Supported Languages		English (e-mail only), Chinese (in China), Vietnamese (in Vietnam)	

Business Overview

Kyowakiden is a Japanese leading plant contractor for turn-key projects, undertaking a complete range of Engineering, Procurement and Construction (EPC) services through project completion.

1. Engineering (System & Machinery for Water treatment /Electrical /Remote monitoring)
2. Manufacturing (Industrial machinery /Water treatment machinery / Control panels)
3. Operation & Maintenance (Water treatment facilities /Production facilities /Rotary machines)
 - Construction and O&M of Japan's largest Seawater desalination facility (50,000 m³/D)
 - Received "Corporate Excellence Prize" at the 53rd Good Company Award 2019

Achievements in Japan and Overseas

[Overseas Business Record]

Design & Manufacturing of Small-scale Seawater Desalination units, machinery for water supply and sewage water treatment facility, and Control panels mainly in Southeast Asian area.

<Vietnam> Installation of "Highly Concentrated Waste Liquid Reduction and Purification System"

<Indonesia> Development and introduction of "Hybrid Energy and Water Purification System" with PV system

Overseas Manufacturing Record (sample)

- Design and manufacturing of sludge collector, grid collector, hopper, screen and control panel for sewage treatment plant
- Manufacturing and installation of cranes for water treatment equipment for a resort area
- Design and manufacturing of control panels for seawater desalination plant

Provide optimal design and manufacturing services with SCM in Japan, China and Vietnam

[Business by local subsidiaries (China / Vietnam)]

Engineering Services for Water treatment

Provide engineering services and EPC services such as wastewater treatment, reuse, and water purification systems primarily for various factories.

Photos:

- (1) Hopper (Vietnam)
- (2) Concentrated waste liquid reduction (Vietnam)
- (3) Purification (China)
- (4) Wastewater treatment (China)



Work System

- Dispatch Japanese mechanical, electrical and construction engineers to Southeast Asia as supervisors
- As needed, dispatch engineers trained in China and Vietnam

Small-scale Distributed Desalination Unit

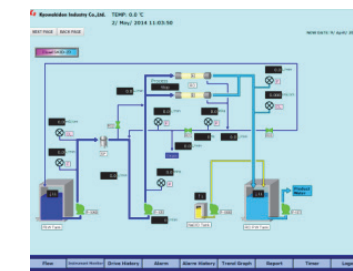
Produces drinking water from saltwater (Compact unit type) / "Hybrid Energy and Water Purification System" with Solar power and Batteries can operate even under unstable power conditions



Purification unit (5 m³/D)



Solar power and Batteries



Remote monitoring

Field	Seawater desalination, Drinking water production	Category	Material, product, system
Registration, Awards	Patent No. JP6284798 "Drinking water production system using solar power generation"		

Technical Overview

[Technical Features]

- High-performance water treatment system which can produce 5 m³/D Safe drinking water from saline well water and river water etc. using Reverse osmosis (RO) membrane.
- Automatic switching system of Solar power + Batteries + Commercial power supply (or Power generator) supports operation in unstable power supply environment.
- Remote monitoring system can check and manage the operation status of the equipment remotely.
- Pilot plant in Indonesia is still in operation.

[Merits of Adopting Technology]

- Short construction period for site work: Purification system is a unit, making installation work easy

[Contributions to Solving Issues]

- Local production for local consumption of drinking water in remote areas such as islands and rural areas remote from cities: No need to bring water or go shopping in the city
- Equipped with solar panels and batteries, this system enables stable water production even in the event of a power failure, and also prevents equipment failure and shortened product life due to power failures.
- Since the operation status of the equipment can be constantly checked by a remote monitoring system, the need for an engineer to go to the site is reduced by the predicting and dealing with failures, membrane replacement, etc.

Conditions for Using Technology

- If there is no commercial power supply, a generator can be used instead, but it cannot be used in conjunction with a commercial power supply.
- For remote monitoring, a data communication network or a dedicated mobile phone line is required.
- For water purifiers and batteries in particular, an enclosure is needed to protect against wind and rain.
- The quality of raw water needs to be analyzed in advance. An additional system may be needed in some cases.
- Drainage of raw water and drainage of concentrated water, etc. must be permitted by the relevant authorities.

Company	NISSAKU CO., LTD.	Establishment	April 1912
Employees	269	Website	https://www.nissaku.co.jp/
Address	199-3 Sakuragi-cho 4-chome, Omiya-ku, Saitama-shi, Saitama 330-0854, Japan		
Contact	Name: Masakazu MIZOBUCHI	International Division	Title: General Manager
	Tel: +81-4-8644-2391	E-mail: int-div@nissaku.co.jp	
Overseas Branches	Nepal (Kathmandu)		
Possible Implementation Areas	Nepal, Benin, Senegal, Zambia, Uganda		
Supported Languages	English, French (e-mail only)		

Business Overview

In the more than 100 years since we were founded in 1912 as the well construction company that introduced the first motorized rotary drilling machine into Japan, we have accumulated extensive experience in groundwater development throughout Japan. Currently we have three main departments: Well drilling and Facility construction, Advanced civil engineering, and Geological survey. We have earned the trust of our customers as a comprehensive engineering company in the field of water and land by providing a one-stop service, ranging from survey and design to construction and maintenance, with a combination of traditional technologies and the latest original technologies. Commencing with well construction in Afghanistan in 1958, we have drilled more than 5,000 wells in more than 40 countries throughout the world.

In particular, since 1989, we have been involved in groundwater supply facility construction projects through ODA grant aid cooperation, mainly in African countries.

[Details of Business] 1. Well drilling 2. Well rehabilitation
 3. Facility construction 4. Advanced civil engineering
 5. Geological surveying, construction consultancy service
 6. Overseas business (ODA Groundwater projects)
 7. Manufacturing and sales of equipment for wells



Achievements in Japan and Overseas

[Well Drilling]

2019: Intake well for underground dam, Miyakojima, Okinawa

2019: Hot spring well, Tokyo

2020: Subsidence observation well for water-soluble natural gas, Niigata

[Advanced Civil Engineering]

2019: Expressway Tunnel Landslide Countermeasure (Piling), Yamagata

2020: Water collecting well for water supply facility, Akajima, Okinawa

[Geological Survey]

2019: Survey of water sources for water supply, Nagano

2020: Hydrological survey of expressway service area, Kanto region

[Overseas Business]

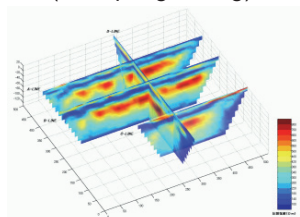
2017: Water supply and sanitation Improvement in rural areas, Senegal

(Won the 2nd JAPAN Construction International Award:

<https://www.mlit.go.jp/JCIA/award/2/projects/#05>)



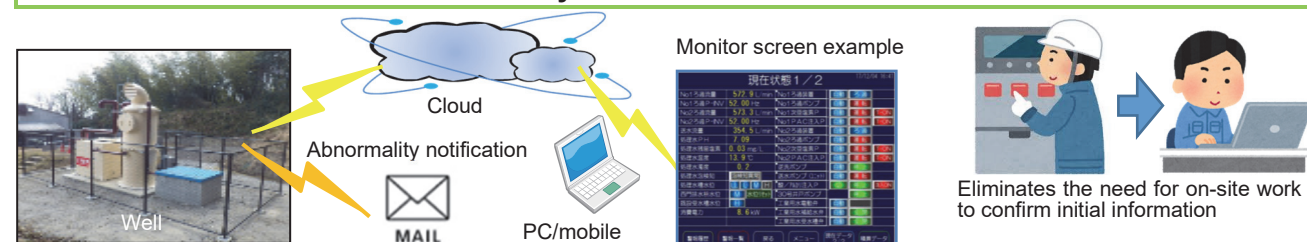
Site arrangement for well drilling
(Hot spring drilling)



Water source survey 3D
analysis (geophysical survey)

IoT Compatible Cloud-based Remote Monitoring System

Remote monitoring and alarm signal transmission of well data made possible
Enables early detection of abnormalities



Field	Well drilling, operation and maintenance	Category	Systems
-------	--	----------	---------

Technical Overview

[Technical Features]

- Automatically measure and remotely transmit data (groundwater level, water discharge rate etc.) needed for the operation and maintenance of wells.
- Also possible to send warning notifications to the mobile phones of managerial staff when measurement data is abnormal.

[Merits of Adopting Technology]

- The lifespan of a well can be extended by monitoring data in real time and detecting abnormalities at an early stage in order to take countermeasures.

[Contributions to Solving Issues]

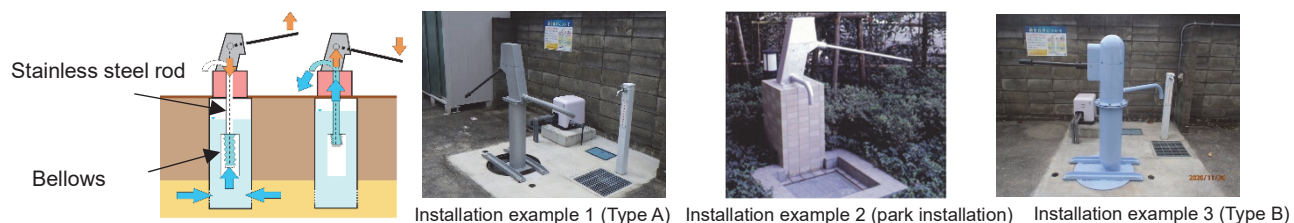
- A well is a facility that requires continuous maintenance. Our company contributes to the maintenance of local water environments by making use of our extensive experience and achievements. We make appropriate recommendations regarding the operation and maintenance of wells based on data that has been obtained through remote monitoring.

Conditions for Using Technology

- To utilize this technology there just needs to be a water level sensor and a flow meter installed in the well, a primary power supply and working mobile phone communications.

Highly Durable Handpump

Achieve a lifting height of 50m with a handpump
A high lift handpump with excellent durability



Field	Well drilling and pumping equipment	Category	Products
-------	-------------------------------------	----------	----------

Technical Overview

[Technical Features]

- Realization of a handpump with excellent durability and high lift height by use of pumping method that utilizes a bellows and a stainless steel rod.
- The pump cylinder has a built-in bellows mechanism, which means fewer parts rubbing against each other when pumping water.

[Merits of Adopting Technology]

- Eliminates the need for periodic replacement of consumable parts, which greatly reduces pump maintenance frequency.

[Contributions to Solving Issues]

- Anti-disaster wells and handpumps are being reevaluated as emergency water sources in times of disaster. Water can be pumped up from a depth of 50 meters with just the small force of a hand pump even in areas with deep groundwater. Local anti-disaster measures can be enhanced by securing water sources that do not rely on electricity.

Conditions for Using Technology

- The inside diameter of the well tube must be 100 mm or greater, and to get a pumping water volume of 10 L/min, the pumping water level must be at a depth of 50 m or less.

Company	ES-Waternet Co., Ltd.		Establishment	1970
Employees	65		Website	https://www.es-waternet.co.jp/
Address	4-24-1, Suwa, Tama-shi, Tokyo, 206-0024, Japan			
Contact	Name: Yuuki SHIMOGAMA		International Marketing & Sales	Title: Manager
	Tel: +81-4-2318-1674		E-mail: mail@es-waternet.co.jp shimogama@es-waternet.co.jp	
Overseas Branches		None		
Possible Implementation Areas		Africa, Asia, Middle East, Latin America		
Supported Languages		English, French		

Business Overview

Under the slogan “Contribute to the development of human beings and society through the water business”, we are involved in the 4 business fields below:

- Agriculture (Field irrigation, Controlling temperature in greenhouses by fogging, etc.)
- Environment (Sprinkling water on roofs, lawn playgrounds, etc.)
- Industry (Sprinklers for melting snow on railways, etc.)
- Oversea Projects (Supplying materials for overseas construction projects)

In the field of “Overseas Projects”, we have supplied pipes, valves and other items for water pipelines and facilities for both public (Official Development Assistance by JICA) and private projects. We are involved in the entire flow of the business - from engineering to logistics.

Achievements in Japan and Overseas

[Project for the improvement of the drinking water supply of the upper part of the city of Conakry (Guinea)]

As a contractor, we installed a ductile iron pipeline (DN1100 mm, 4.46 km length).

Replacing the FRPM pipes with ductile iron pipes has strengthened the pipeline, and made the water supply more stable.



Installing ductile iron pipes
(Completed in 2017)



[Grant Aid for Environment and Climate Change for Escuela de Ciencias Forestales de la Universidad Mayor de San Simon (Bolivia)]

We designed the layout of sprinklers and plumbing in greenhouses, supplied the whole system (greenhouses, sprinklers, irrigation controller, soil injector, nursery pots, etc.) and dispatched supervisors.



Outside and inside of the greenhouse
(Completed in 2019)

Work System

We have dispatched supervisors and managed the construction work at overseas sites.

Hydrostatic Water Pressure Control Technology

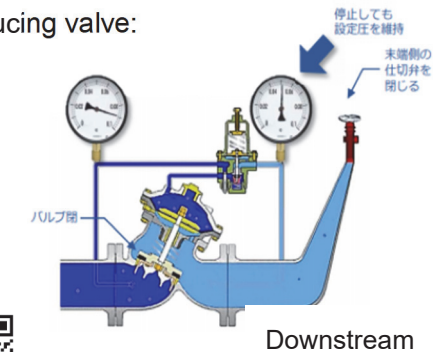
System costs can be reduced by water pressure control without using electricity.

“Hydrostatic Water Pressure Control” with a pilot type pressure reducing valve:

In cases where a butterfly valve is used for pressure reducing, the downstream pressure will be the same as the upstream when the water flow is shut off.

With a pilot type pressure reducing valve, the downstream pressure can be sustained as set even when the water flow is stopped.

Details: https://www.es-waternet.co.jp/product/list?series_id=94



Available Range:

We can design economical water pressure control systems using hydrostatic pressure control.

We can make total proposals such as described below:



Field	Water supply, Irrigation	Category	EPC
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Technical Overview

[Technical Features]

- Hydrostatic pressure control is performed using a pilot type pressure reducing valve.
- It is possible to maintain the set downstream pressure on the pressure reducing valve.
- The pipe type/size on the downstream side can be selected based on the pressure you set.
- The pressure reducing valve is operated by water and does not require electricity.

[Merits of Adopting Technology]

- In addition to the pressure reducing function, the following functions can be added as options. Water level control / Flow rate control / Pressure sustaining / Shutoff in an emergency.
- No new electrical work is required.

[Contributions to Solving Issues]

- On the downstream side, the pipe type can be selected based on the set pressure. Therefore, the material cost is more reasonable than cases where butterfly valves are used.
- It is possible to introduce the system even if the electric power supply is unstable.

Conditions for Using Technology

- A hydrostatic pressure control system cannot be constructed under conditions that exceed the usage range of the pilot type pressure reducing valves.
- The difference between the upstream and downstream pressure shall be 0.07 MPa or more.
- Diameter of pressure reducing valves: DN50-1200 for irrigation, DN50-800 for waterworks.

Company	ABE NIKKO KOGYO CO., LTD.	Establishment	1949
Employees	519	Website	http://www.abe-nikko.co.jp
Address	Gifu Headquarters: 3-13-3 Rokujoomizo, Gifu City, Gifu Tokyo Headquarters: SK Building-S, 3rd Floor, 2-3-18, Shimoochiai, Shinjuku, Tokyo		
Contact	Name: Hirokazu DEGAWA Tel: +81-3-5906-5631	Overseas Business Department E-mail: h.degawa@abe-nikko.co.jp	Title: Manager
Overseas Branches	Sri Lanka Liaison Office (Colombo)		
Possible Implementation Areas	Sri Lanka, Bangladesh, Africa, Middle East, South Pacific, Bhutan, Vietnam, etc.		
Supported Languages	English, Chinese		

Business Overview

[Core business] Construction of bridges and water tanks using prestressed concrete (PC) and manufacture of sleepers for railways.

- [Characteristics]
- Construction of the first PC tank in Japan
 - Pioneer of PC tanks --- Over 8,500 units in Japan
 - Top share in domestic market for railway sleepers

[Business description]

- Design and construction of PC structures (tanks, bridges, buildings, etc.)
- Design and manufacture of PC sleepers
- Design and manufacture of secondary PC products
- Design and construction of reinforced concrete (RC) structures
- Design and manufacture of secondary RC products
- Repair and reinforcement work for concrete structures (PC, RC)

[Main ordering party]

Ministry of Land, Infrastructure, Transport and Tourism, local governments, expressway companies, railway companies including JR



PC Tank
(Sri Lanka)

Achievements in Japan and Overseas

1981: Constructed PC tanks and PC bridges as a subcontracting business in Egypt and other countries. PC sleepers were exported to Vietnam and Indonesia.

2014: Sri Lanka, PC tank, participated in JICA support project "Verification Survey with the Private Sector for Disseminating Japanese Technologies for Pre-stressed Concrete Tanks for Water Supply and Sewage Treatment Systems"

2017: Sri Lanka Liaison Office established.

2018: Dhaka Mass Rapid Transit Line 6 construction started (3 companies JV, construction management by prime contractor).



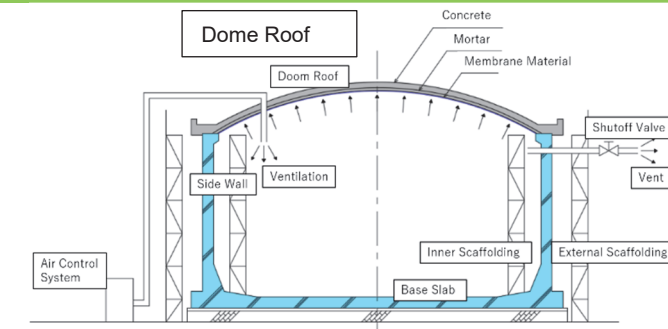
Railway PC Sleepers

Work System

- Cooperate in the design of low temperature tanks in the energy field.
- Cooperate as a subcontractor for construction of bridges, tanks, etc. in more than 15 countries overseas.
Dispatch of engineers, design verification, delivery of materials and equipment. Technical guidance and human resource development for local workers.
- Construction management as a prime contractor for the construction of Dhaka Mass Rapid Transit Line 6.

Air Dome Construction Method

Method of Constructing a Concrete Dome Using a Membrane Material Supported by Air Pressure



Field

Water storage tanks

Category

Construction method

Technical Overview

1. Applicable to the construction of concrete domes such as the roof of cylindrical PC tanks.
2. Replaces conventional support work and formwork with a construction method in which a dome is placed using a membrane material supported by air pressure and a mortar shell constructed on top of it serves as the formwork support.
3. Consists of three parts: Membrane material, mortar, and air control system.
4. Track record of more than 300 units in Japan.

[Technical Features]

1. Improvement of safety

In the past, total support was assembled on the inner surface of the tank, but since there is no such process, dangerous work is eliminated and safety is improved.

2. Simplification of work

Since the work for support work and formwork is greatly reduced, the work of skilled workers such as scaffolders and carpenters is reduced, and the work is simplified.

3. Shortening the construction period

Assembling and disassembling formwork support work and dome inner surface anticorrosion work are eliminated, shortening the construction period.

4. No need for anticorrosion measures and maintenance

The film is left as is and used as an anticorrosive material.

5. Eco-friendly

Since no wood is used as the formwork material, no waste material is generated, which saves resources and is environmentally friendly.

Conditions for Using Technology

Can be applied to tanks with an inner diameter of up to 50 m.

Company	SUGAWARA SETSUBI Inc.	Establishment	November 1998
Employees	45	Website	http://agile-innovation.co.jp/index.html
Address	3-21-2 Motoderacho, Tsushimashi, Aichi, 496-0034, Japan		
Contact	Name: Masaki SATO	Department: Sales	
	Tel: 0567-24-1743	E-mail: info@sugawara-setsubi.co.jp	
Overseas Branches		Vietnam (Da Nang City), Myanmar (Da wey City)	
Possible Implementation Areas		Vietnam (Da Nang City only)	
Supported Languages		English (e-mail only), Vietnamese	

Business Overview

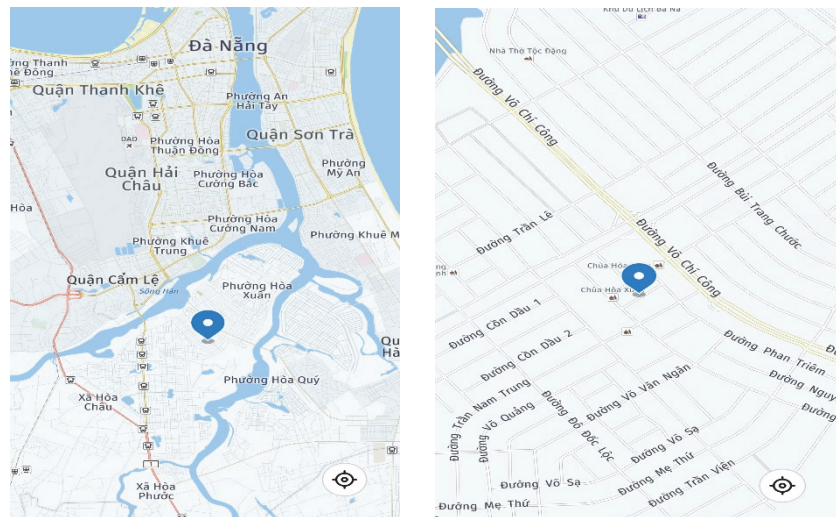
1. We are a member of the Agile Innovation Holding Company group, and provide water supply and drainage work services in Aichi Prefecture, Japan. Our company has a market share of about 10% in Aichi Prefecture.
 2. We are establishing a new service to provide training in technical skills within one year using electronic manuals or remote systems.
 3. We could provide other construction services in addition to foundation work, such as installation of side-ditches.
- * Agile Innovation Holding Company is the parent company of SUGAWARA SETSUBI Inc. It provides comprehensive services for house builders and individuals, including agency sales of LP gas and design services.

Achievements in Japan and Overseas

2019: We started SUGAWARA VIETNAM Co., Ltd., which provides original plumbing and piping plans.

2021: We plan to hire new employees and provide home remodeling to expand the business.

SUGAWARA VIETNAM Co., Ltd.: <http://sugawaravietnam.com/lien-he.html>



Map of SUGAWARA VIETNAM Co.,Ltd.

Address: Nguyễn Hiền Lê, Hoà Xuân, Cẩm Lệ, Đà Nẵng 550000 Vietnam

Work System

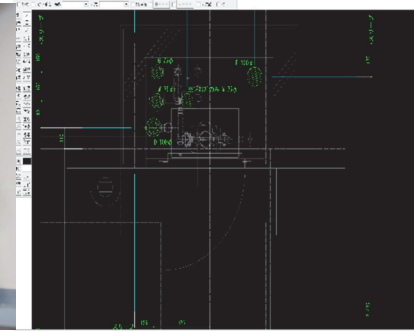
- To pass on our knowledge and skills, we hire a few foreign trainees every year.
- To start the development of human resources with a high level technique or design in Vietnam, we are implementing original remote education services.
- We have more than 30 craftsmen, enabling us to promptly and carefully handle issues.

We can handle all plumbing work, from design to construction

We have official licenses from Tokyo and Aichi, enabling us to provide highly skilled services



Plumbing



CAD design



Civil engineering work

Field	Energy, health, poverty and infrastructure	Category	Method of construction
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Technical Overview

[Technical Features]

Our company handles everything from design to construction by ourselves.

1. Take advantage of our experience in installing the plumbing for over 1,000 houses and many small apartments per year. This enables us to handle various waterworks projects for houses, apartments, and buildings.
2. We are able to construct all plumbing, including septic tanks, elevated water tanks, and SWBPs which are being adopted in Vietnam.

[Merits of Adopting Technology]

1. "SUGAWARA VIETNAM Co., Ltd." can respond quickly to local requests.
2. We can easily exchange ideas with each other concerning the design of the water supply system, and construction by Vietnamese or Japanese personnel.

[Contributions to Solving Issues]

1. Our skilled craftsmen instruct local staff on how to do plumbing and design.
2. We would like to contribute to the regional economy by recruiting more people and expanding "SUGAWARA VIETNAM".

Conditions for Using Technology

- We are currently preparing to obtain constructing qualifications for plumbing in Vietnam.
- In order to start construction business, we are now investigating local suppliers in Vietnam.



Company	TBR Co., Ltd.	Establishment	June 1960
Employees	34	Website	https://www.tbrjp.co.jp
Address	4-63, Odabuchi-cho, Toyokawa city, Aichi, 442-0844, Japan		
Contact	Name: T. KINOSHITA	Environmental Division	Title: Acting General Manager
	Tel: +81-5-3388-2171	E-mail: info@tbrjp.co.jp	
Overseas Branches	China (Shanghai)		
Possible Implementation Areas	East Asia, Southeast Asia		
Supported Languages	English (e-mail only), Chinese		

Business Overview

1. River purification business

For rivers that are heavily polluted by domestic wastewater, mainly in developing countries, river purification is carried out by using a contact aeration purification system that is easy to maintain and a floating island construction method with BIO-CORD installed.

2. Wastewater treatment business

Design, proposal and construction to strengthen the functions of wastewater treatment facilities in accordance with the wastewater treatment regulations of each country.

3. Manufacture and sales of braided ropes for fisheries, industry, and leisure

With a production base in China, we develop our business mainly in East Asia and Southeast Asia.

[Original Technology]

We have manufacturing technology for microbial fixed beds, fiber filter media, artificial seaweed, etc. using braided rope manufacturing technology.

Achievements in Japan and Overseas

1995: Established a local subsidiary in Shanghai, China

2010: Established a sales office in Shanghai, China

2010: "Dianchi Lake Water Purification Project", Kunming, China

2012: "GOMBAK River Package 2" Malaysia RIVER OF LIFE Business

2015: "Water Purification Project of Qiangwei Reservoir" in Lianyungang City, China

2016: "Jinze Reservoir Water Purification Project", Shanghai, China

2016: "Tainan Technology No. 1 Wastewater Treatment Project Reconstruction Project" Taiwan

2017: "GOMBAK River Package 3A & 3B" Malaysia RIVER OF LIFE Business

2019: "Galaxy Flood Reservoir Water Purification Project" Bekasi, Indonesia

Work System

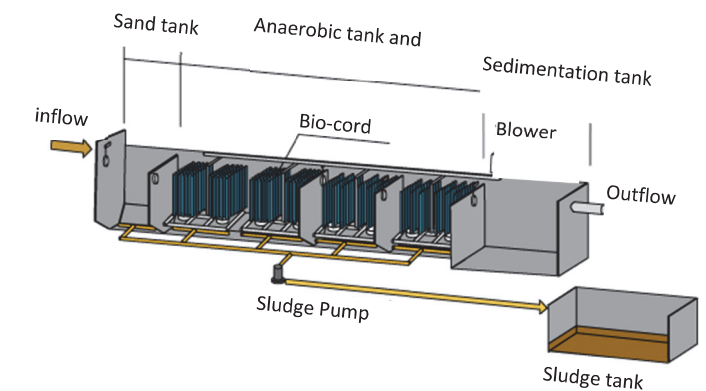
- We have a local subsidiary in China and cooperate with several construction companies.
- Have formed alliances with contractors in Malaysia, Taiwan and Indonesia.

Efficient Water Environmental Improvement System "BIO-CORD"

Low-tech water quality improvement sustainable system utilizing microorganisms for developing countries



Installed directly in shallow rivers



Aeration type

Field	River purification / water purification	Category	System
Registration, Awards	1997: Science and Technology Commissioner's Award		

Technical Overview

[Technical Features]

- "Bio-Cord" fixes a large amount of microorganisms to special fibers, and has the effect of increasing the self-cleaning effect of rivers by simply laying them in rivers.
- Compared to small-scale sewerage, the facility area is 1/3 and the maintenance cost can be reduced to 1/6 (in the case of a treatment facility of 500 m³/day).
- Since oxygen is deficient in rivers with a high pollution load, aeration type is used.
- It is used not only for river purification but also for wastewater treatment in agricultural villages and landfill leachate treatment.

[Merits of Adopting Technology]

- There is no difficult construction, allowing installation by workers in developing countries.
- Maintenance can be done by local workers by only removing the inflowing refuse and checking operation of the equipment.

[Contributions to Solving Issues]

- It has been adopted as a measure for domestic wastewater treatment until a sewage treatment plant is built. Since it can be installed in small community units, facilities can be built with a low budget.
- Since maintenance can be done by local residents, it contributes to the creation of employment.

Conditions for Using Technology

- In the location where it is installed directly in the river, it needs to be straight and the flow velocity is preferably 10 to 30 cm/sec.
- For rivers with a BOD of 100 mg/L or higher, use the aeration type.
- Cannot be applied for rivers with a large influx of earth and sand. Therefore, it is better to target small waterways through which only domestic wastewater flows, rather than large-scale rivers.
- In the case of rivers with a BOD of 400 mg/L or more, factory wastewater may flow in, so it is better to take measurements on the factory side, which is the source of pollution.

Company	Ogushi Drilling Co., Ltd.	Establishment	1906
Employees	15	Website	http://www.ogushi.co.jp
Address	Atsuhara 2202, Fuji City, Shizuoka, Japan		
Contact	Name: Hiromi AOKI	Tokyo Head Office	Title: Office Manager
	Tel: +81 3 6893 2960	E-mail: aoki@ogushi.co.jp	
Overseas Branches		Uzbekistan, Afghanistan, China, Korea	
Possible Implementation Areas		English speaking areas in the above countries and surrounding areas	

Business Overview

1. Well Drilling (Groundwater, hot spring, geothermal, gas, oil, earthquake/water quality observation wells)
2. Surveys incidental to wells (Electrical exploration, electromagnetic exploration, physical logging, underwater television camera surveys)
3. Equipment work incidental to wells (Well pump, hot water pump, air lift, filtration equipment, gasseparator, water supply / hot water, supply equipment)
4. Maintenance of wells and equipment

[Original Technology]

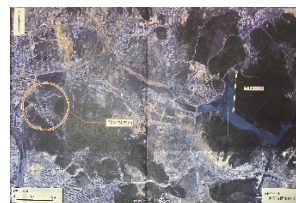
(1) Double Casing Method

We developed the "double casing method" as an improved method aiming for a larger amount and a higher temperature of hot water at the source in the event the amount of hot water pumped has decreased over time.

A heat-retaining fiberglass pipe is inserted as a straw tube to the bottom of the hole, and hot water from the hot spring is pumped from the hot water vein at the bottom of the hole with a higher temperature. At the same time, the gas dissolved in the hot spring can be eliminated, enabling more efficient hot water pumping.

Achievements in Japan and Overseas

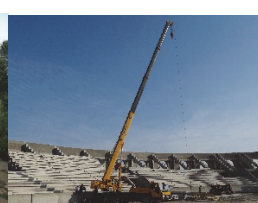
1. China: Hot Spring Survey in Lushun Konan Village
2. Uzbekistan: Water Source Development in Fergana Region Wide Area
3. Kazakhstan: Hot spring development in Almaty city (consulting)
4. Afghanistan: Water source development in Kabul (consulting)



1.China



2. Uzbekistan



3. Kazakhstan

Work System

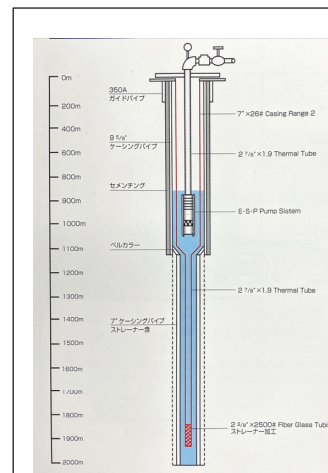
Uzbekistan: Local joint corporation

Afghanistan: Local joint corporation

China / Korea: Local affiliated companies

12000 Wells Drilled, 600 Hot Springs Drilled Since 1906

Double Casing Method for Hot Spring Wells



Hot spring pump room:
Yugashima Hotel Resort



Hot spring: Mikuni Onsen in Fukui

Double Casing method

Field	Drilling Groundwater	Category	Construction method
Registration, Awards	"Double casing method" Hot spring water pumping equipment and pumping method (Patent No. 3101183)		

Technical Overview

[Technical Features]

Water from hot springs excavated deep in the earth tend to decrease in volume and go down in temperature over time. As an improvement measure, the "double casing method" technology was developed with the aim of recovering the volume and temperature of hot water.

[Merits of Adopting Technology]

- Increases the volume and temperature of hot spring water, and recovers the decreased volume and temperature of hot water.
- Restoration of existing water sources is lower in cost and quicker than drilling new wells.

[Contributions to Solving Issues]

The requirements for hot springs are set by the "Hot Spring Law" or related laws in each country.

This is especially important in China, Taiwan, and other Asian countries where the development of hot springs has been remarkable in recent years. The standards and guidelines are even stricter than in Japan.

The "double casing method" is effective for existing hot springs. It aims to restore aging hot springs that no longer meet the "hot spring" standards by increasing the volume and temperature of hot water.

[Video Link]

<http://www.ogushi.co.jp/technology/>

Conditions for Using Technology

- The well diameter (casing diameter) of the source must be 150 mm or more.
- We will examine the effectiveness of this method by submitting the casing program and electrical logging results in advance.



Company	SAWATA CONSTRUCTION CO., LTD.	Establishment	1943
Employees	86	Website	https://www.sawata.com/
Address	1-23 Kaidenishimachi, Hofu, Yamaguchi, Japan		
Contact	Name: Shuji SAWASHIGE	General Affairs Department	
	Tel: +81-80-3522-2634	E-mail: soumu@sawata.com	
Overseas Branches		None	
Possible Implementation Areas		Vietnam	
Supported Languages		Vietnamese (Our two Vietnamese staff can correspond via e-mail.)	

Business Overview

1. General Construction Industry : Civil Engineering business, Building Service and design development
 2. Real Estate development business : Development of real estate for sales
- Weekly Diamond, Japanese Special Journal for Business, ranked us 186 out of 1100 companies in Japan. We were ranked number 1 in Yamaguchi Prefecture

[Original Technology]

- (1) Agricultural Civil Engineering: Underdrain Construction, seat pipe method, drains water off farmland properly.
- (2) Agricultural Civil Engineering: FOEAS, Farm Oriented Enhancing Aquatic System, maintains groundwater level.
- (3) Civil Engineering: PALTEM FR method, Pipeline Automatic Lining System Flooring method, repairs inside of sewage pipe
- (4) Cross Laminated Timber method: This method makes wood as strong as concrete

Achievements in Japan and Overseas

[Achievements in Japan]

- (1) Seat Pipe Method
- (2) FOEAS

March 2019 Scheme for Improvement of Agricultural Competitiveness
Infrastructure Scheme for Maintaining Farmland in Ueda Manabe region in Hofu

- (3) PALTEM FR method

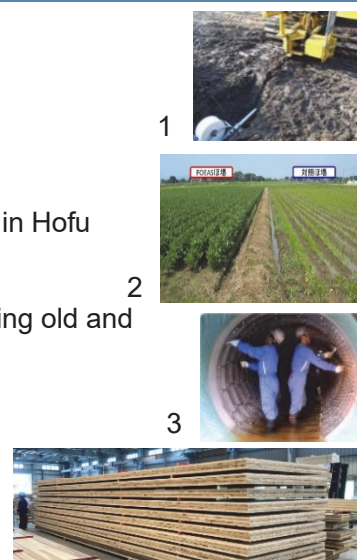
September 2020 Scheme for life Elongation of Public Sewage ; improving old and dirty pipe in Hofu

- (4) Cross Laminated Timber method

October 2019 Construction of New Head Office Building

Total Floor Area 1,192.8 m² CLT used for this building : 97.3853 m³

4



Work System

Sending our Japanese engineers, supervisor, and contractor is negotiable. Bringing in your equipment is also negotiable.

PALTEM Flooring method

This method regenerates and renovates decript pipes

Case of continuous step

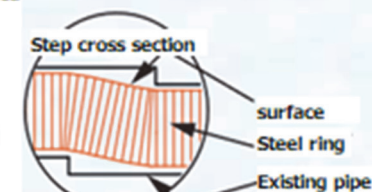
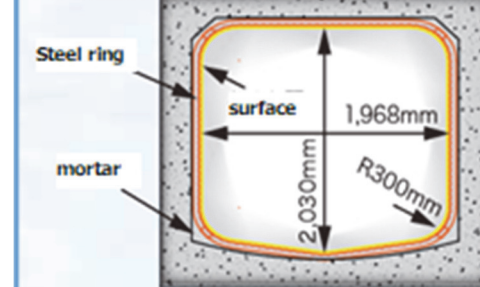
Tube type : RC rectangular pipe of Cast-in-place concrete

Size : W=2,250mm T=2,250mm

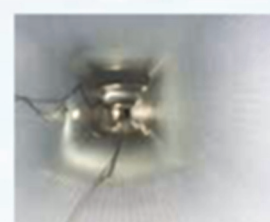
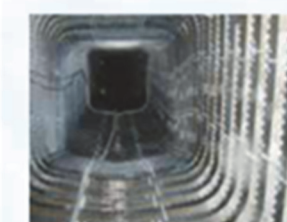
Extension : 61m

linear : Straight line with 8 steps in the vertical direction

Step : 450mm



The PALTEM FR method is reliable because it is used in various shapes.



Field	Renovation of sewage pipe, maintenance of water	Category	Construction method
Registration, Awards	We are certified by the PALTEM method association		

Technical Overview

[Technical Features]

We attach high density polyethylene fitting material and surfacing material with an iron ring assembled inside pipes in the tube axis direction. The space between the existing pipe and renovation facing is filled with filler in order to renovate the pipes. The renovated pipe is composite of the existing pipe and renovation material.

[Merits of Adopting Technology]

Our custom-made design can respond all types of requests: Any faults or strength problems in pipes

[Contributions to Solving Issues]

For the problem of deteriorated sewage pipes and pipes for supplying agricultural water, we preserve them and prevent these pipes from losing their function.

[Video Link]

<http://www.paltem.jp/method/movie/fr201212.wmv>

Conditions for Using Technology

Round Form: 800 – 3,000 mm

Not Round Form: Short side; More than 800 mm, Long side; Less than 5,000 mm

Company	SAKAEGUMI Corporation	Establishment	1955
Employees	35	Website	https://www.sakaegumi.jp/
Address	9-19-1 Itazawa, Kamigo-cho, Tono-shi, Iwate, Japan		
Contact	Name: Yoshihiro SASAKI		
	Tel: +81-198-65-3032	E-mail: tono@sakaegumi.jp	
Overseas Branches		Brazil, Indonesia (under preparation)	
Possible Implementation Areas		Brazil, Indonesia, USA	
Supported Languages		English, Portuguese	

Business Overview

1. General construction business
2. Repair and reinforcement work for concrete structures
3. Deterioration investigation, diagnosis, and repair and reinforcement design of concrete structures
4. IP leasing business for Crack Injection technology (33 companies in JAPAN)
5. Management for the Society for Pressure Adjustment Grouting Technology

[Original Technology]

(1) Sakae Adjustable Pressure Injection System (SAPIS): Patented in Japan, the U.S., Brazil and Indonesia

(2) Sakae Infrastructure life prolongation work Maintenance Management system

Ministry of Economy, Trade and Industry: Selected as “Companies Driving Regional Growth” and “Small to medium enterprises and a small-scale enterprise 300 in 2020”

Achievements in Japan and Overseas

1. Domestic Achievements: 359 construction projects, as of July 2020
2. Overseas Achievements: Selected as [JICA SDGs Business Supporting Surveys 2018 (Partnership Promotion Survey) and 2019 (Business Model Formulation Survey)], Technical certification by the Ministry of Public Works, Indonesia in 2019 (under review)



Repair of bridge piers (Brasilia)

Sewage Treatment Plant (Sao Paulo)

Repair of highway facilities (Jakarta)

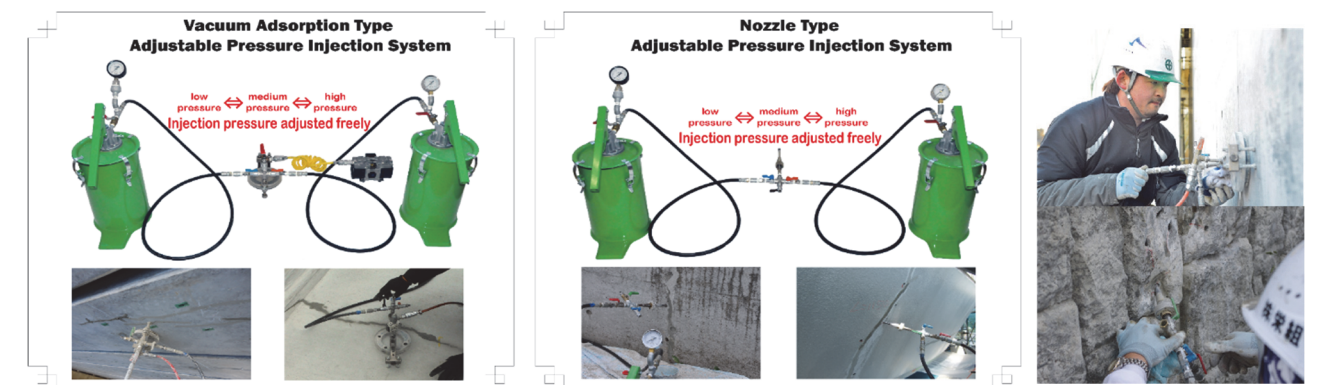
Technical Certification Board (Bandung)

Work System

We are preparing to set up local subsidiaries in Brazil and Indonesia. Based on these subsidiaries, we will provide crack injection equipment and technical services, and promote the spread of preventive maintenance technology for concrete structures by teaching repair and reinforcement techniques to local engineers. In addition, we will collaborate with local vocational education institutions to train repair and reinforcement technicians and make international contributions.

Crack Repair Method, SAPIS (Sakae Adjustable Pressure Injection System)

Enables free adjustment of the injecting pressure, and injection of the crack repair material



Field	Repair of concrete structures	Category	Construction methods and equipment
Registration, Awards	NETIS:TH-110002-A (SAPIS Vacuum Adsorption type), TH-110003-A (SAPIS Nozzle type), Patented in Japan, the U.S., Brazil and Indonesia		

Technical Overview

[Technical Features]

Improved repair performance: Injection pressure can be freely adjusted from low to high pressure, injection can even be performed for minute cracks, multiple materials can be injected continuously, and original construction management standards have been set.

Excellent versatility and adaptability: All kinds of repair materials can be injected, from organic to inorganic repair materials for civil engineering structures to buildings.

Reduction of environmental impact: Zero waste discharge and shortened construction period reduce environmental impact, and there is less loss of injection materials.

[Merits of Adopting Technology]

The following merits can be obtained while maintaining the same construction cost as before.

1. It is possible to repair cracks and improve the soundness of the building frame at the same time.
2. It is possible to apply this technology to various types of cracks that cannot be handled with existing technologies within the construction period.

[Contributions to Solving Issues]

Extends the service life of existing concrete structures and reduces infrastructure maintenance costs.

The life cycle cost can be reduced and efficient construction investments can be made.

[Video Link]

<https://www.youtube.com/watch?v=czq1KPpKsK8>

<https://www.youtube.com/watch?v=1GVMFIRXqu8>

https://www.youtube.com/watch?v=D7bjQSwuP_E

Conditions for Using Technology

There are no particular natural conditions (weather, temperature, etc.) that restrict construction.

Applicable to high or narrow places as long as there is enough space for manual labor.

Work in water is not allowed.

Company	EARTH SHIFT CO., LTD.		Establishment	1983
Employees	62		Website	https://www.earth-shift.co.jp/
Address	2-17-16 Yamazaki, Aoi-ku, Shizuoka-shi, Shizuoka, Japan			
Contact	Name: Satoshi MURAKAMI	General Department		Title: Director
	Tel: +81-54-278-8309		E-mail: soumu@earth-shift.co.jp	
Overseas Branches		None		
Possible Implementation Areas		Vietnam		
Supported Languages		English		

Business Overview

1. General construction
2. Infrastructure maintenance
3. Construction consultant (Design)
4. Real estate

[Original Technology]

- (1) "Rope access": Qualified person performs close visual inspection that cannot be handled by ordinary inspection vehicles, such as wind power blades and bridges. Repair work can be done as needed.
- (2) "Single-i technology" (Micro-destructive inspection method inside concrete): With current non-destructive tests, the state of fine cracks inside the concrete cannot be grasped. However, this method allows the situation inside the concrete to be grasped on site. As a result, it is possible to correctly grasp the damaged state of the floor slab, which is important for deciding on the maintenance and repair measures for the structure.

Achievements in Japan and Overseas

[Bridge inspection results with rope access]

- April 2016 – March 2017: 116 Bridges (EX: Shinsesso Bridge)
- April 2017 – March 2018: 355 Bridges (EX: JR overpass)
- April 2018 – March 2019: 368 Bridges (EX: Highway viaduct)
- April 2019 – March 2020: 409 Bridges (EX: Sakura Bridge)
(EX: Wind power generation blades)
- April 2020 – March 2021: 500 Bridges (Plans) (EX: JR overpass)

[Micro destruction survey results by single-i]

- April 2018 – March 2021: 18 Bridges (EX: Highway)

Work System

Dispatch of Japanese engineers and technical guidance of local workers.

We dispatch Japanese engineers to sites for both technologies, and train local engineers to develop local business.

Rope Access Technology

This technology enables close visual inspection of difficult to access places such as bridges, dams, and slopes



Field	Bridge surveys	Category	Construction method
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Technical Overview

[Technical Features]

This technology is an inspection technology that uses rope access. It allows difficult spots to be reached using a special anchor.

[Merits of Adopting Technology]

The introduction of this technology eliminates the need for aerial work platforms, bridge inspection cars and scaffolding. In addition, it does not require traffic restrictions.

Conditions for Using Technology

Natural conditions: It can be installed except in strong winds (over 15 m/s).

Site conditions: No occupancy on the bridge

Applicable area: Overseas correspondence is possible

Single-I method Technology

Technology that enables damage to be accurately inspected inside concrete on site.



Field	Concrete internal surveys	Category	Construction method
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Technical Overview

[Technical Features]

Single-i method doesn't cut rebar when drilling survey holes.

[Merits of Adopting Technology]

Adhesion inspection of concrete can be accurately performed without any destruction.

- Measurement results can be checked in real time
- It greatly reduces skeleton damage.
- Due to the small diameter, it is possible to inspect even in places with high reinforcing bar density.

Conditions for Using Technology

Natural conditions: Even when it rains, work can be performed by protecting the area.

Unable to work: Underwater

Applicable area: Overseas correspondence is possible

Company	TOYO KIKAI Co., Ltd.	Establishment	1947
Employees	100	Website	http://www.toyo-kikai.co.jp/
Address	1-5-30 KimachiDori Aoba-ku Sendai, Miyagi, 980-0801, Japan		
Contact	Name: Hiroshi SASAKI	Title: CEO	
	Tel: +81-22-222-9831	E-mail: sasaki_h@toyo-kikai.co.jp	
Overseas Branches		Thailand (Bangkok)	
Possible Implementation Areas		ASEAN countries	
Supported Languages		English	

Business Overview

1. Maintenance and Repair Services for Railway Maintenance Vehicles.
Supporting the railway industry by supplying good quality railway maintenance vehicles.
A maintenance agent of;
Nippon Plasser K.K.
Niigata Transys Co., Ltd.
Santo Co., Ltd.
NICHIJYO Corporation (cooperation factory)
2. R&D OF SPECIAL MAINTENANCE VEHICLES.
Developing and manufacturing special vehicles based on customer needs and wants.
3. R&D UNIQUE JIG AND MACHINERY FOR CIVIL ENGINEERING AND RAILWAY INDUSTRY.
Better tools for improving efficiency of field work for railway and construction business.

Achievements in Japan and Overseas

[TRAM (Thai Railway Advanced Machinery Co., Ltd.)] A subsidiary company of Toyo-Kikai
Launched office in Bangkok, Thailand in September 2019
Began maintenance and repair activities of railway maintenance vehicles.
We respond to monthly and annual maintenance needs as well as emergency repair work.
Planning to expand business into Asian countries in the near future.
Our local partner, Thai Agency Engineering Inc., supports manufacturing capability for TRAM.
TRAM utilizes a human exchange program supported by ATOS to improve local engineering skills.

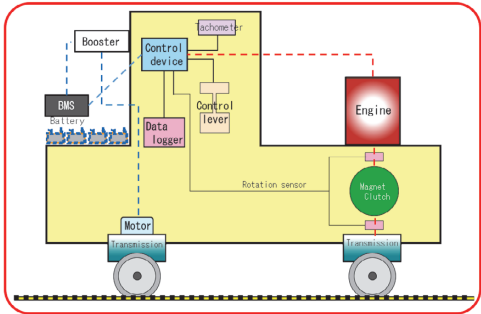
[Toyo-Kikai Co., Ltd. Sendai, Japan]
Repair and maintenance of more than 400 special vehicles in Japan over 70 years.
Have a good reputation for inspection skill and immediate response for emergency trouble.

Work System

JAPAN: 100 employees. 2 plants and 4 branch factories.

Developing railway maintenance vehicles tailored to local needs

Please contact us concerning problems that need to be solved at the work site.



- Three Key Components:
1. Hi-Brid System (with an engine and motor for dynamic force to avoid stopping on the rails.)
2. Magnet Clutch (magnetic clutch able to hold high volume driving force with no contact.)
3. B. M. S. (Battery Management System designed to extend life of lead acid batteries)

Field	Support improving on site work	Category	Developing machine, equipment
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Technical Overview



[Developed Aerial Work Platform]
Used for inspection of high tunnel walls and ceilings. The machine features a platform that can move up and down as well as to the left and right a maximum of 400 mm.
This function eliminates the need for workers to reach out from the vehicle to the wall which is unsafe.

[Dust separator for ballast stone]
Crushed ballast stone must be cleaned at a certain interval. Traditionally, ballast stone was cleaned off site. This machine eliminates “stone replacement work” by performing the job on site.
Dimensions Width: 2,300 mm
Length: 900 mm Height: 1,530 mm



Conditions for Using Technology

We will improve your on-site civil engineering work that entails many difficulties involving unnecessary work, uneven quality, and unsafe work. We help enhance civil engineering work by developing machines and equipment that makes your job easier.

Company	KFC Ltd.	Establishment	March, 1965	
Employees	282	Website	https://www.kfc-net.co.jp/	
Address	3-2-17 Nishi-Tenma, Kita-ku, Osaka, Japan			
Contact	Name: Futoshi MATSUSHIMA	Construction and Repair Technology Office, Technical Department		General Manager
	Tel: +81-6-6363-4108	E-mail: imsa-grp@kfc-net.co.jp		
Overseas Branches		China (Tangshan, Hebei Province)		
Possible Implementation Areas		Thailand		
Supported Languages		English (e-mail only)		

Business Overview

[Manufacture and sales]

Tunnel excavation materials, construction and civil engineering post-construction anchors, rivet screws and other materials for concrete repair

[Civil engineering business]

Road and railway installation, tunnel interior construction and seismic retrofitting of civil engineering structures

- Strength in fastening materials, e.g. anchors for construction in civil engineering
- Top market share in Japan for rock bolts used in NATM for mountain tunneling methods
- Abundant experience in Japan for earthquake-resistant shear reinforcement of civil engineering structures with RMA method.



[Original Technology]

- Numerous technologies in various fields including concrete repair and reinforcement, tunnel support, seismic retrofitting and safety countermeasures

Achievements in Japan and Overseas

2012: Establishment of Tangshan Rixiang Construction Materials & Technologies Co., Ltd. in Tangshan, Hebei Province, People's Republic of China; Started production of rock bolts

[Tunnel Auxiliary Method]

2009: Algeria East-West Expressway FIT Method (Long-precedent construction with GFRP tubing and long-scope reinforcement)

2013: Hong Kong MTR XRL825 Construction Section Me Method (Small-bore Steel Pipe Injection Type Long-nose Receiver/Long-span Mirror Reinforcement Work)

2016: Singapore LTA MRT T207 Silica Resin PUIF Construction Method (Resin-based Injection-type Front Work)

2019: Indonesian ASAHAN3 Hydropower Plant AGF Method (Grouting-type long-nose receiving)

[Waterproof Sheet]

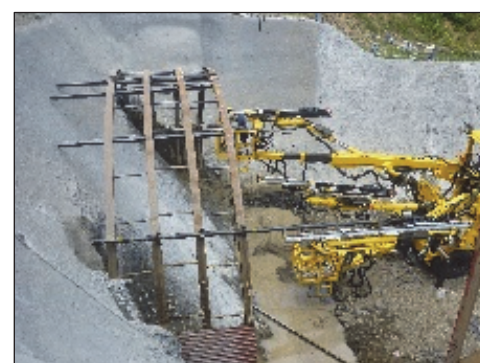
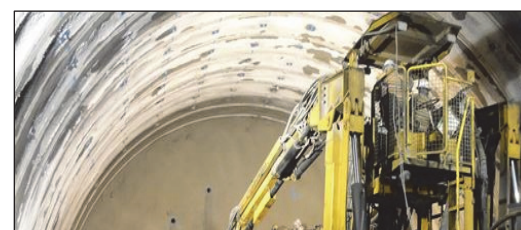
2015: Vietnam Haivan Tunnel Waterproof Sheet (High Panel SS Sheet)

[NINJA POWER SHEET]

2019: Thailand EXAT (Expressway Authority of Thailand) Trial construction on actual bridge

[Rock Bolt]

2020: Nepal Nagdonga Pass Road Tunnel (SN Twist Rock Bolt)



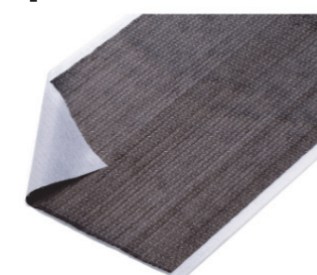
Work System

Dispatch Japanese engineers and provide technical guidance to local workers as necessary.

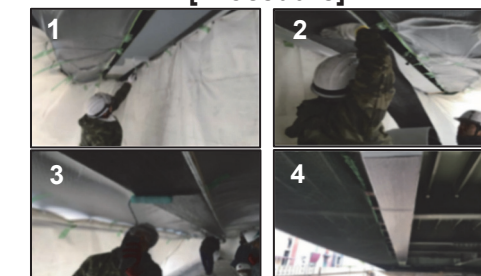
NINJA POWER SHEET

Repair and reinforcement of various structures with special laminated fiber sheets that excel in workability and reinforcement effect

[NINJA POWER SHEET]



[Procedure]



1. Applying adhesive
2. Sheet attachment
3. Applying impregnating material
4. Completion

Field	Repair and reinforcement of various types of concrete and steel structures	Category	Construction methods and materials
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Technical Overview

[Technical Features]

- Special laminated fiber sheet: With this method, special laminated fiber sheets which are layered onto special sheets with carbon fiber are bound to structures with adhesive resin, and then coated with a high-performance impregnating material.
- Easy construction, no experience required for work: No need for deforming work due to highly permeable impregnating material
- High-weight carbon can be used: Up to 2,400 g/m² per layer of high-weight carbon fiber sheet can be attached.
- Short construction period: Multi-layered construction can be performed in one layer, enabling short construction periods.
- Excellent flexibility: The flexible sheet enables easy attachment to corners

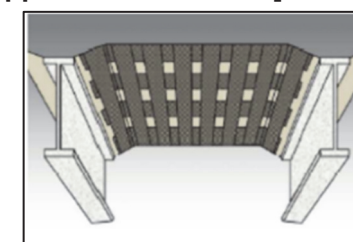
[Merits of Adopting Technology]

- Compared with the conventional method (Continuous fiber sheet method), the construction cost can be reduced by shortening the number of construction days.
- The high-performance impregnating material can be completely impregnated, so that high-quality construction workmanship is realized.
- Since experience is not necessary for applying and impregnating the sheets, construction workers can be easily recruited.

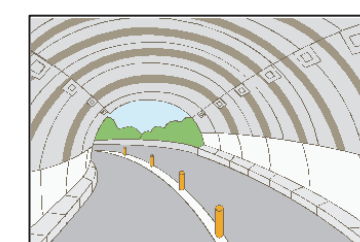
[Contributions to Solving Issues]

- It is possible to reduce the impact on traffic because the bridge reinforcement construction can be implemented without restricting traffic in main lanes.
- Short construction period reduces congestion caused by traffic regulation under bridges in the case of construction with a high-lift work vehicle.
- Easy construction enables employers easily to recruit construction workers.
- It is possible to reinforce existing structures inexpensively without carrying out large-scale construction work.

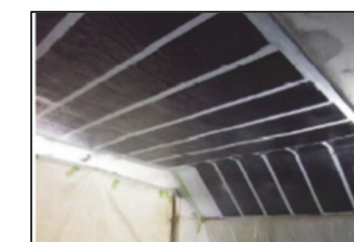
[Applicable Structures]



Bridge



Tunnel



Box culvert

Conditions for Using Technology

- Dries concrete and steel surfaces if they are wet due to condensation etc.
- Remove the fragile parts on the adhesive surface.



Company	Toyo Kensetsu Kohki Co., Ltd.		Establishment	1933
Employees	200		Website	http://www.toyokensetsukohki.co.jp/english/
Address	2-4-15 Sangenya-Higashi, Taisho-ku, Osaka 551-0002, Japan			
Contact	Name: Ryosuke SONE	Business Development Department, Global Business		Supervisor
	Tel: +81-6-6552-0507		E-mail: globalbiz@toyokensetsukohki.co.jp	
Overseas Branches	None			
Possible Implementation Areas	Asia, Oceania, Middle East, Africa, etc.			
Supported Languages	English, Chinese, Korean			

Business Overview

Though we rarely see rebar in our daily life, rebar are incorporated into architectural and civil engineering structures, and play an important role in maintaining the strength to withstand disasters and accidents. We at TOYO contribute to safe and secure life by providing the machines and systems to process rebar with high quality and high efficiency.

[Development, manufacture and sale of rebar processing machines]

We respond to customers' requests for cutting and bending rebar in various situations based on our proven trust and performance for over 60 years of experience in the rebar processing machine business.

[Comprehensive proposal of rebar processing factory]

We propose a line system to increase the efficiency at the site where the rebar is discharged after cutting and transferred to bending station; and a centralized management system for rebar calculation, raw material loading, rebar processing, and transferring & shipment of processed products.

[Global sales]

We provide solutions best-fitted to each customer and after-sales services in cooperation with our local partners in South Korea, Taiwan, Singapore, Malaysia, Vietnam, Thailand, Indonesia, the Philippines, Myanmar, Cambodia, etc. We also have an extensive sales record to the Middle East and Africa.

Achievements in Japan and Overseas

1971: First overseas deal triggered by an inquiry from Singapore.

2008: Delivery of automatic machines to the first rebar processing factory of a major general contractor in South Korea.

2012: Our automatic machines selected to meet the very strict requirements for rebar processing for precast concrete elements for Hong Kong-Zhuhai-Macao Bridge construction project.

2017: Delivery of automatic machines to the largest steel mill in the Philippines. The machines are used for the Manila Metro Rail Transit System construction project.

2018: Delivery of automatic machines to the first rebar processing factory in Myanmar.

2019: Delivery of rebar benders for high strength rebar to a major general contractor in the Philippines. The machines are used for the North-South Commuter Railway construction project site.

2019: Achieve over 80 percent market share for rebar processing machines in Japan according to Teikoku Databank's research.

2020: Delivery of automatic rebar processing machine to a major steel manufacturer during Covid-19 pandemic.

Work System

We basically send our engineer(s) to local customers' factories at the time of new installation, commissioning and operation guidance for automatic machines. We are now expanding our service network so that we can provide attentive service for our products in cooperation with our local partners. In areas without a local partner, we respond as soon as possible by phone, email, messaging app, etc. to cope with customers' inquiries on operation, maintenance, and troubleshooting. To further improve customer satisfaction, we are now strengthening support by developing IoT equipment.

High-quality and high-precision rebar processing

Reformation of rebar industry – achieve sustainable development by saving labor and wastage



Field	Rebar/reinforcement work	Category	Machine and system
Registration, Awards	Many patents, for example, rebar counter, combination cutting system, casting structure to achieve low noise emission, etc.		

Technical Overview

[Technical Features]

- Preciseness: Processed dimensions ± 1 mm, processed angles $\pm 1^\circ$ excluding the effect of rebar surface. (This precision does not apply to some models.)
- Trusted processing quality: To meet the strict construction standards in the earthquake prone country of Japan.
- Automatic machine's productivity per worker: Approx. 3 to 5 times compared to that with conventional manual machines. (Average production per worker with seven hours: 1~2 tons at construction site with manual machines, and 5~7 tons in factory with automatic machines)
- Scrap reduction: Rebar scrap can be reduced by cutting out different lengths from one raw material.

[Merits of Adopting Technology]

- Uniformly aligned products make the assembling and installation of rebar easier and faster.
- Our products can handle the processing of high-strength rebar with higher earthquake resistance and of screw rebars which can reduce the labor on site and shorten the construction period. Our machines are advancing together with the technology in the industry.

[Contributions to Solving Issues]

- Labor saving machines solve the issues of labor shortages and labor wage hikes.
- By processing rebars in a factory, no rebar fabrication space is needed at the construction site and workers' safety will be enhanced. Other advantages are reduction of rebar wastage by product management and quality control in a factory, and prevention of construction delays due to bad weather.

[Video Link]



Automatic Cutting Machine: CS-185HB



Automatic Bending Machine: TBS-13-6-NC

YouTube Channel



Conditions for Using Technology

- Use at ambient temperature of 0 to 40°C.
- Make sure to take measures against rainwater when machines need to be installed outdoors.
- Use stabilizer or other measures against voltage fluctuation.
- Consult us regarding voltage, breaker capacity, and other details.

Company	Nikken Lease Kogyo Co., Ltd.	Establishment	1967
Employees	1,400	Website	http://www.nrg.co.jp/nikkenlease
Address	Sumitomo Suidobashi Bldg. 3F, 2-7-8 Kanda Sarugakucho, Chiyoda-ku, Tokyo 101-0064, Japan		
Contact	Name: Masakazu ENDO	Technical Security Headquarters	Executive Officer
	Tel: +81-3-3295-6631	E-mail: m-endou@nrg.co.jp	
Overseas Branches	Vietnam, Myanmar, Philippines, Thailand		
Possible Implementation Areas	Southeast Asia		
Supported Languages	Overseas projects are handled by local staff in the local language		

Business Overview

Our company rents more than 2,500 types of temporary equipment, such as scaffolding, shoring formwork and other items used at construction sites, as well as temporary houses, desks, chairs, tables, storage lockers, office automation equipment, and electric appliances, mainly to the construction industry. We also provide storage and transportation equipment and pallets for the logistics industry, and welfare equipment.

At present, we have more than 120 bases in Japan, and our professional engineers prepare temporary construction plans and strength calculations for scaffolding, shoring, and formwork for construction, provide assembly guidance and safety inspections, as well as BIM and CIM planning.

Overseas, we have bases in four countries (Vietnam, Myanmar, the Philippines, and Thailand), and we are developing a rental business of temporary equipment for local construction companies.



Achievements in Japan and Overseas

We have participated in various construction and civil engineering projects and large-scale works in Japan over the years. During this time, we have been involved in flagship projects listed below, providing the planning and rental temporary scaffolding and shoring materials for construction companies involved in the building of Shinkansen (bullet train), expressways, and Olympic-related facilities, as well as the Nhat Tan Bridge, Thai Binh Thermal Power Plant, and the Nghi Son Refinery in Vietnam. In recent years, we developed a new product named Darwin (ND System) as a wedge-tensioned scaffold with the handrail pre-installation method, which has become the mainstream in scaffolding, and has been highly evaluated by customers for its excellent safety and work efficiency. In the field of temporary construction planning, we are working to strengthen our technical capabilities to respond to BIM and CIM by anticipating the rapid shift from 2D to 3D.



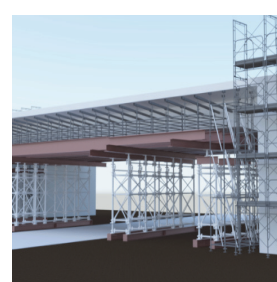
Construction site (Vietnam)



Construction site (Thailand)



BIM



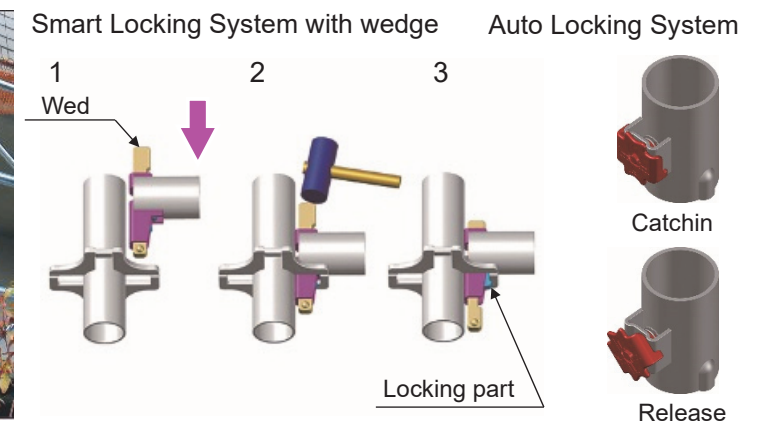
CIM

Work System

1. Vietnam (Hanoi Head Office, Ho Chi Minh City Branch, Da Nang Sales Office), Myanmar (Yangon Branch), Philippines (Manila Branch), Kingdom of Thailand (Bangkok)
2. Overseas staff: 14 Japanese, about 300 locally hired staff (including about 100 CAD operators)

Wedge-connecting scaffold with preceding handrail "ND System"

Latest scaffolding system, which is safe and quick to assemble, can be fixed in 3 steps



Category	External scaffolding and shoring	Category	System
Registration, Awards	NETIS: KT-160006-VE Patent No. 5264008, Patent No. 5473039		

Technical Overview

[Technical Features]

1. All components are divided into bar shapes, and the use of $\phi 42.7$ pipe makes even the heaviest component only 11.1 kg in weight.
2. "On-disk method" is adopted to fix the connecting materials. The assembly operation is surprisingly fast with only 3 steps.
3. "Auto-Locking System" uses standard joints for easy connection and unlocking, and it has excellent visibility.
4. Preceding handrails have passed the "100kg fall arrest performance test" of the Temporary Construction Industry Association in all directions.

[Merits of Adopting Technology]

- By dividing all the members into bar shapes and adopting thin pipes, the weight of the members becomes lighter, which improves cost-effectiveness and the speed of erection.
- Using the on-disk method for wedges (horizontal members), the number of man-hours required for erection is decreased and the speed of construction is increased.

[Contributions to Solving Issues]

- Preceding handrails are equipped as standard devices, enabling handrails to be maintained at the top of the scaffold at all times. Accidents during erection and dismantling of scaffolds can be greatly reduced.

[Video Link]

<https://www.youtube.com/watch?v=hof0X2kKwGI&t=9s>

Conditions for Using Technology

- Do not carry out erection or dismantling work when danger can be anticipated such as during bad weather, including strong winds, heavy rain, or heavy snow.
Strong wind: Wind with an average wind speed of more than 10 meters per second.
Heavy rain: Rainfall of more than 50 millimeters at one time.
Heavy snowfall: Snowfall of more than 25 cm at one time

Company	MATSUZAWA KAWARATEN Inc.	Establishment	June, 1948
Employees	18	Website	https://www.yane119.net https://7tsubaki.com
Address	3-32 Yokobori, Nakagawa, Nagoya City, Aichi Prefecture, Japan		
Contact	Name: Koki MATSUZAWA	Overseas Business Department	
	Tel: +81-70-8422-9287 (JPN)	E-mail: koki-jpn@yane119.net	
	Tel: +63-977-778-3550 (PHIL)		
Overseas Branches		Philippines (Manila), Vietnam (Hanoi)	
Possible Implementation Areas		Philippines, Myanmar, Vietnam, Brunei and ASEAN regions	
Supported Languages		English, Filipino (Tagalog)	

Business Overview

Nanatsubaki is a 100% subsidiary company of Matsuzawa Kawareten which handles UV-C lamp business.

1. OFF-GRID Business: Composed with Solar-panels and LPG gas-generators to provide electricity in unconnected areas. Used batteries are recycled and used as storage batteries.
2. UV-C Manufacturing/Sales: Deactivate virus and bacteria with UV-C lamp.
3. Container Business: Remodel marine used containers to provide comfortable life-style space. Combining these 3 technologies may provide COVID-19 treatment facility to ASEAN countries and Africa regions.

Examples: Refurbish marine used containers for habitats, warehouses and other facilities may provide space for various needs. Easier to transport and easy to install. Each container may be adjusted and customized for individual needs.



Facilities composed of containers can be used for habitats, clinics, online education facilities; and toilets with UV-C lamps may create safe, smart container towns (communities) anywhere.

Achievements in Japan and Overseas

2010: Established Nanatsubaki, Started accepting disabled employees.

2012: Overseas expansion/Established Kawara factory in Vietnam/Established CAD center in the Philippines.

2016: Vocational training school "Tone-Numata Techno Academy" as Director

2020: "Regional disaster prevention cooperation office" and "Designated emergency evacuation building", agreement signed with Nagoya-City

We have installed more than one hundred UV-C lamps

in a manufacturing factory of NIDEC in PEZA zone.

UV-C 254 and 222 have been installed in toilets, factories, canteens and shuttle buses. Installing UV-C lamp inside the

shuttle bus may prevent the virus from outside the factory from entering the factory.

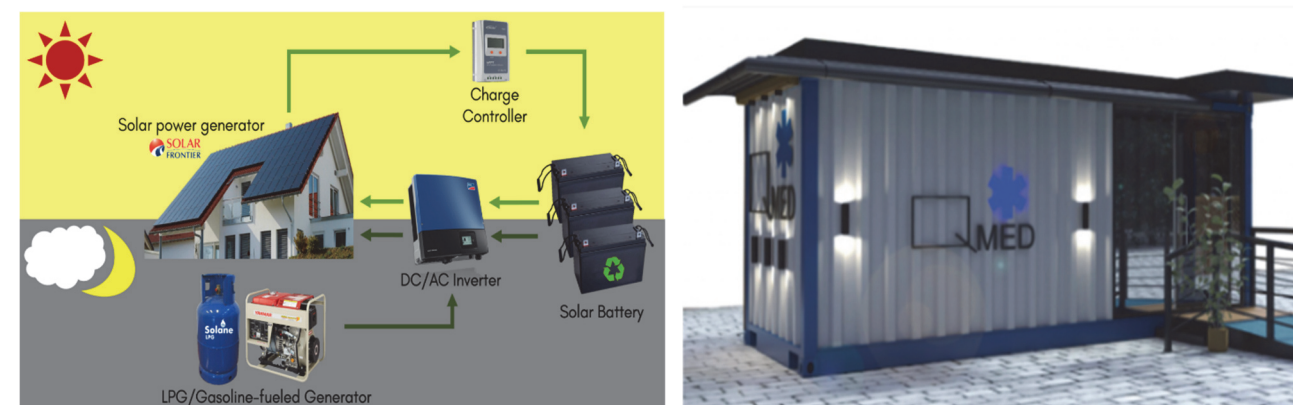


Work System

- There are more than 2 Japanese specialists staying in the Philippines.
- Holding training sessions and lectures for handling of UV-C lamps safely by local personnel.
- Main manufacturing factory is located in Shanghai China.

Smart Container town UV-C lamp & Off-grid installed

We provide safe and clean habitat spaces at a low cost and high speed anywhere



Field	Energy, health, poverty and infrastructure	Category	Product, system
Registration, Awards	Registered: United Nations Industrial Development Organization (UNIDO), Department of Health, Philippines Certificate: Aichi industrial science and technology center, food industry technology center (Bacteria killing certificate)		

Technical Overview

[Technical Features]

Combining three technologies below enables habitat space, hygienic medical facilities and container towns to be created from refurbished containers.

- Off-Grid System: Electricity generated by solar panels and LPG gas generator is used to charge recycled lead-acid batteries. Ordinary household generator was converted to generation with LP gas, creating effective and sustainable system that recycles lead-acid batteries. The system was assembled in the Philippines.
- UV-C Lamp Deactivation system: 254 nm Wavelength UV-C lamp deactivates viruses and bacteria. Moreover, this system safely and effectively deactivates viruses and bacteria in confined spaces under IEC62471 and Japan's JIS safety standard.
- Container: Container is assembled in the Philippines. Container may be customized for local needs like African regions. Marine used containers with modified interiors can be transported by ship.

[Merits of Adopting Technology]

- Systems installed in marine used containers can be transported worldwide, and after the container arrives in the needed country, local staff can easily transport it by truck.

[Contributions to Solving Issues]

- This technique makes it possible to provide sanitary and safe living space in Africa, and by combining many different facilities in containers, it is possible to set up a smart container town in a place where there is no water or electricity. By installing an online lesson system (online or computer) inside the container, lessons can be provided in depopulated and poor areas in the same manner as in urban areas. The customization possibilities inside the container are endless, such as the enabling of fish farming on land.

Conditions for Using Technology

- Although off-grid has an LPG as generator for backup power, it is difficult to install it in areas with extremely heavy rain because it mainly generates electricity from sunlight.
- For more details, concerns and questions please visit 7tsubaki.com or e-mail at koki-jpn@yane119.net.

Company	Sanwa Boring Co., Ltd.	Establishment	May 4, 1967
Employees	51	Website	http://www.sanwa-boring.co.jp
Address	464-2 Horikawamachi, Toyama-shi, Toyama, Japan		
Contact	Name: Masaaki YUKAWA	Title: President and CEO	
	Tel: +81-76-424-2617	E-mail: info@sanwa-boring.co.jp	
Overseas Branches		East Timor (plans to establish a local subsidiary in April of 2021)	
Possible Implementation Areas		Indonesia, East Timor	
Supported Languages		English, Indonesian	

Business Overview

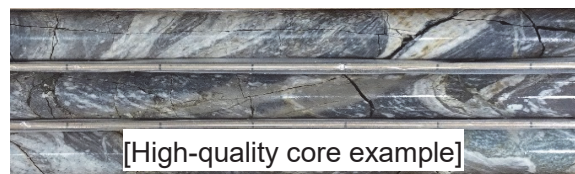
Sanwa Boring was founded in 1967 and mainly handles geological surveys as well as work to respond to geological conditions. In particular, the company relies on its background in geology to provide scientific geological information. The company focuses on work related to the boring of long, large-diameter holes and provides expertise in terms of geological surveys and boring work.

- (1) Geological survey business
 - Geological surveys, surficial geological surveys
 - Landslide surveys, stability analysis, countermeasure work design
 - Residential geological surveys, ground guarantees
 - Soil testing, rock testing
 - Soil contamination surveys
- (2) Boring work business
 - Various types of landslide countermeasure work, various types of slope protection work, ground anchor work
 - Falling-rock and avalanche countermeasure work



Achievements in Japan and Overseas

Business name	Location	Category	Client	
Geological survey of rivers within the jurisdiction	Within the jurisdiction	Rivers	MLIT	Toyama Office of River and National Highway
Riverbed material survey of the Jinzu River and Sho River	Within the jurisdiction	Rivers	MLIT	Toyama Office of River and National Highway
Geological survey of Araya, Toyota	Araya, Toyota, Toyama	Roads	MLIT	Toyama Office of River and National Highway
Geological survey of the Osawano Toyama Minami Road	Nirehara, Toyama	Roads	MLIT	Toyama Office of River and National Highway
Geological survey related to traffic safety within Toyama's jurisdiction	Within the jurisdiction	Roads	MLIT	Toyama Office of River and National Highway



[High-quality core example]

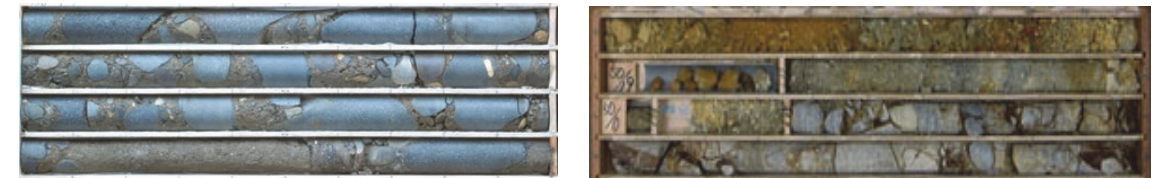
Our company collects high-quality cores through boring that uses original core collection technology, thereby providing advanced geological information. This has resulted in an extensive track record of geological survey results for many infrastructure development projects.

Work System

- We are planning to send a Japanese engineer to East Timor to train around ten local workers there.
- We have brought boring machines (a survey boring machine and rotary percussion drill for ground anchor work) in from Japan. We are also planning to establish an equipment center in Dili, the capital of East Timor.
- We plan to establish a local subsidiary in East Timor. We will then use that as a base to train human resources and help deal with the shortage of workers in Japan.
- We will try to use trained East Timor workers and engineers to expand into Indonesia.

Boring technology to collect high-quality cores

Technology that provides useful geological information necessary for the detailed designs of important structures and the consideration of road disaster measures



High-quality core (left) versus general core (right)

* The core on the right contains fine particles and is generally messed up, making it impossible to accurately determine the actual ground state.



The most important thing for collecting high-quality cores is the control of drilling water. We use an original valve developed by our company to automatically and continuously supply the right amount of water to the core tube with a pressure of 0.5 Mpm. This automated drilling water control can also handle cases where, for example, the hole is starting to get blocked, so even relatively inexperienced operators can collect high-quality cores. This means that local workers can more quickly be trained to a competent level.

Field	Geological surveys, design of civil engineering structures	Category	System
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Technical Overview

[Technical Features]

The boring control items relevant for collecting high-quality cores are: (1) the management of circulating fluid (water management), (2) the drilling rotation speed, (3) the drilling rod's penetration/pull-out strength, and (4) the drilling rod's ascent/descent timing. For our approach, the control items are managed as described below.

Control item	Method
(1) Circulating fluid management (water management)	A relief valve is used to automatically and continuously supply the right amount of water to the core tube with a pressure of 0.5 Mpm. This approach can also handle changes in the boring-hole situation, such as when the hole is starting to get blocked.
(2) Drilling rotation speed	Records of the rod rotation speed, amount of supplied water, and rod ascent/descent during excavation are measured, and this information is organized/accumulated for each geological condition and converted to a drilling-technology database. When doing on-site drilling work, digital measuring equipment can be installed to visually compare the drilling situation with past data in real time, and utilized in the operator's drilling judgment during work.
(3) Drilling rod's penetration/pull-out strength	
(4) Drilling rod's ascent/descent timing	

To collect high-quality cores, the general approach is to utilize the experience and intuition of the boring operator to control each relevant item while working. Our company's original approach is to automate and visualize work based on the statistical data analysis skills of veteran operators in order to enable the collection of high-quality cores even by non-veterans.

[Merits of Adopting Technology]

1. Boring survey technology for collecting high-quality cores by using survey equipment (boring machines, relief valves) can be provided.
2. Geological analysis technology based on the results of boring surveys, etc. as well as evaluation methods can be transferred to provide technology related to the design of civil engineering structures and road disaster measures based on useful geological information.

[Contributions to Solving Issues]

To vitalize the private economic activity of developing countries, it is necessary to develop transportation networks and enhance the capabilities of both organizations and human resources in charge of managing such development and follow-up maintenance. With our technology, geological technology at the level of Japan and other developed countries can easily be transferred.

Conditions for Using Technology

The above technology is suitable for geological surveys of areas with complex ground structures, such as the crescent-shaped archipelago of Japan, as opposed to the primarily bedrock-based ground of the continents of Europe and America.

Chubukenzai

Company	Chubukenzai Co., Ltd.	Establishment	1982
Employees	10	Website	http://chubukenzai.pkit.com
Address	4-15-3 Miyoshi, Yatomi-City, Aichi, 498-0046, Japan		
Contact	Name: Chikara ITO	Foreign Dep.	Title: President
	Tel: +81-567-68-3088		E-mail: chikara-ito-chubu@mbr.nifty.com
Overseas Branches	None		
Possible Implementation Areas	Vietnam, Myanmar, Indonesia		
Supported Languages	English (e-mail, simple conversation)		

Business Overview

1. Waterproofing 2. Corrosion protective coverings 3. Insulation 4. Painting

[Original Technology]

- (1) RIM (Reaction Injection Molding) system: This system uses a specific applicator with a 4 ton truck as the mobile plant for waterproofing and corrosion protective covering. First, the material is heated inside the pre-equipment to a temperature of 65 to 70 degree, and then liquid A and B are mixed at the tip of the spray gun. After spraying, it turns into a gel form, which dries and solidifies in a couple of seconds. The sprayed material can be walked on in 3 minutes. This shortens the construction period and reduces costs.
- (2) Insulation spraying: We use the same machine system. The material is heated to approximately 40 degree. It then dries and solidifies in the same manner. It is used on walls, ceilings and floors. It makes it warmer in the winter and cooler in the summer, while helping to prevent condensation.
- (3) Non-combustible insulation: It is sprayed on the ceilings of elevator pits, machine rooms and walls. Fire protection is essential everywhere, including overseas. It is also effective in preventing injuries caused falling ceiling boards in earthquake prone countries.

Achievements in Japan and Overseas

2018, 2019: We participated in overseas support seminars for SMEs (Vietnam, Myanmar)
 2015: Renovation work for gymnasium ceiling at elementary school (1,800 m²)
 2018: Revetment work, Prevention of salt damage in concrete with RIM system (560 m²)
 2019: the ceiling insulation (1,400 m²)



Non-combustible insulation



Polyurea spray



Insulation spray

Work System

- A local corporation will be established in Vietnam. Based there, we will develop human resources and provide technical guidance.
- We want to expand to Southeast Asia in the future.
- Two Vietnamese and two Chinese are working at the company, and three engineers will be hired soon.
- We will increase the number of staff based on the core human resources and plan to expand.

Urethane · Polyurea spraying system

Drying time is short (Finger touch: 10 seconds, Walk: 3 minutes), shortening the construction period and reducing cost



Slate roof sprayed with Polyurea



Waterproof rooftop sprayed with Urethane

Field	Waterproofing work	Category	Construction method
Registration, Awards	Suwael which is one type of Polyurea Conforms with Ordinance No. 15/JWWA K 143 of the Ministry of Health, Labor and Welfare Conformity. Highly safe material (Clean water tanks and fish farms)		

Technical Overview

[Technical Features]

- Fast molding and solidifying, the material can be walked on in 3 minutes after spraying.
- Good workability on ceilings and vertical walls. There is no dripping and seamless coating is possible.
- Excellent chemical resistance, weather resistance, and abrasion resistance.

[Merits of Adopting Technology]

- Spraying system provides following benefits compared to hand-painted waterproofing
 1. Shortens the drying period and construction period
 2. Reduces labor cost
 3. Total reduction of 10% in cost
- At the time of regular factory renovation, our system enables work to be completed in a short period while the production line is down.

[Contributions to Solving Issues]

- Compared to new replacement of factory equipment, the life of equipment can be extended
- by this spraying system and costs can be effectively reduced (For example, tanks and pits)
- By eliminating waste, the economic cost for the nation can be reduced. It leads to job creation and the transfer of technology to young people.

[Video Link]

<http://chubukenzai.p-kit.com>

Facebook: <https://www.facebook.com/chubukenzai>

Conditions for Using Technology

- Can be constructed within 90 meters (the hose is 90 m long).
- Need to protect from rain in areas where it rains during the rainy season.
- Done using a specific applicator with a 4 ton truck as the mobile plant for waterproofing and corrosion protective covering.

Company	Archi-Cube INC.	Establishment	October 2000
Employees	7	Website	https://www.archi-cube.com/
Address	6-28-2, Joto-dori, Gifu-shi, Gifu-ken, Japan		
Contact	Name: Yoshitomo OISHI	Deployment	Title: Representative Director
	Tel: +81-58-268-8122	E-mail: info@archi-cube.com	
Overseas Branches	Vietnam		
Possible Implementation Areas	Vietnam, Taiwan, Cambodia		
Supported Languages	English, Vietnamese (e-mail, phone)		

Business Overview

We are an architectural design consultant specializing in the design of offices and factories, operating in the Nagoya region. When we build in a plant, we use a 3D laser scanner to accurately survey the point clouds and then proceed with the design using the 3D modeling software Autodesk REVIT, so the client can make effective use of the space using 3D technology. During the design and construction phase, we propose a "visualization" of cost, design, and environmental performance. You can see it in a 3D view (VR, etc.) so that your company can share the construction project. The 3D model data can be used for facility management during construction and after completion, and in the future when installing machine tools or updating lighting fixtures. For your project, our company's female engineers with rich experience will be involved in the design process, so we can build an environment where women can work comfortably. We are also able to provide support for overseas projects in English and Vietnamese. We have given many lectures at Autodesk University 2020 and other venues throughout Japan.

Achievements in Japan and Overseas

[Japan]

Design and supervision of a logistics warehouse (steel structure, approx. 8,000 m²) (photo at left)

Design and supervision of an office (steel structure, approx. 2,500 m²) (middle left)

[Vietnam] Design and construction of a nursery school in Buôn Ma Thuột, Vietnam (middle right photo)

Design and construction of an office in Dak Lak Province (Ea Kiết)

[Taiwan] Design of renovation of Chiayi Prison dormitory in Chiayi (right photo)

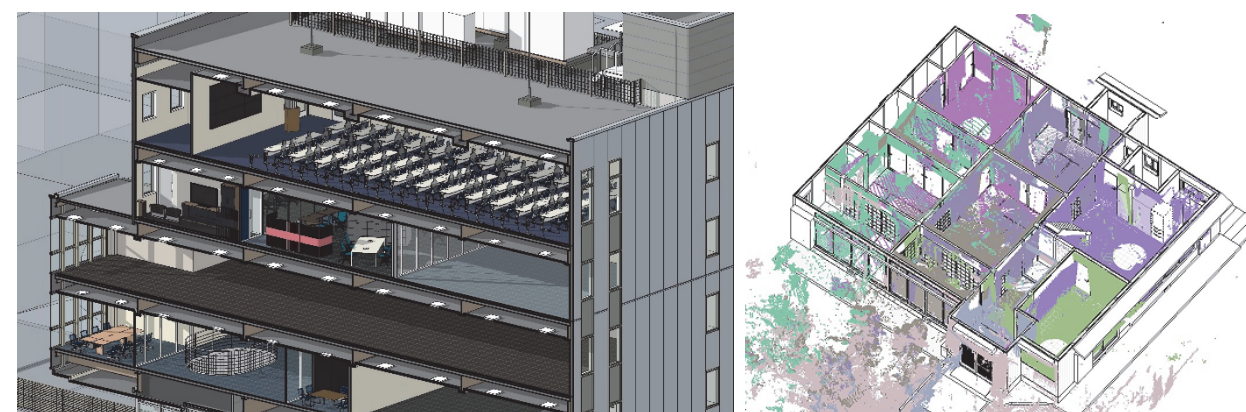


Work System

Established a local subsidiary in Vietnam (LIVE+VIETNAM) (Head office: Ho Chi Minh City, Branch office: Buôn Ma Thuột). The company will train Vietnamese engineers who can handle laser measurement and 3D modeling, and expand its business to Vietnam and other third countries (Cambodia). (The company has business partnerships in Taiwan and Cambodia.)

3D Laser Measurement + Building Information Modeling

This is a method for measuring buildings and their surrounding environment in 3D, and using the data for everything from design to maintenance management



Field	Construction and civil engineering, research, planning, design and maintenance	Category	System
Registration, Awards	The 1st Wooden Architecture AWARD Best of the Best Award The 1st Gifu Wooden House Building Contest, Excellence Award		

Technology Overview

[Technical Features]

- Design and supervision using 3D models based on Building Information Modeling (BIM) technology
- Proposal of an efficient design method using a 3D laser scanner to measure the current conditions of existing site.
- Utilization of 3D data for post-construction maintenance (facility management)

[Merits of Adopting Technology]

- Use VR and 3D views to enable real-time information sharing with people involved in the project.
- We will show the technology overseas that has already become commonplace for projects in Japan and provide a mechanism to utilize it in the future.

[Contributions to Solving Issues]

- We can provide Japanese design and supervision technology and quality.
- The technology can be disseminated to third countries through the country of introduction.
- We can expand our business not only in cities but also in rural areas by promoting the introduction of design systems.

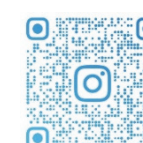
[Video Link]



Website (Japanese)



Website (English)



Instagram

Conditions for Using Technology

None in particular

Japan Construction International Award

(honored by the Minister of Land, Infrastructure, Transport and Tourism of Japan)

Awarded Companies



About Japan Construction International Award

The Ministry of Land, Infrastructure, Transport and Tourism of Japan established “Japan Construction International Award (honored by the Minister of Land, Infrastructure, Transport and Tourism of Japan)” in 2017 to commend overseas construction projects as global showcase of Japanese “quality infrastructure” initiatives which demonstrate Japan's strengths. It also commends small- and medium-sized construction companies(SME) which play leading roles in overseas markets. Through this award, we aim to promote global understanding of the Japanese companies' competitiveness and expect more projects to be carried out by Japanese companies.

Kidoh Construction Co., Ltd.

[1st SME Category]

- **Business Description:** Underground pipe laying works using various pipes by pipe jacking method
- **Overseas Business:** Taiwan, Malaysia, Singapore, Vietnam, Indonesia, and Myanmar
- **Company Introduction:** Kidoh Construction receives orders in Indonesia and Myanmar on a continuous basis through its excellent pipe jacking method technology and its dissemination and market education activities.

• Overview of Overseas Business:

- The Ministry of Foreign Affairs supports ODA-related projects for medium and small companies. Thanks to such support, in 2012, Kidoh Construction received an order for a dissemination project for pipe jacking method technology in Indonesia.
- The company promoted the superiority of pipe jacking method technology in Southeast Asian countries including Vietnam and Indonesia. At the same time, the company cooperated with local parties to prepare specification standards regarding technology and estimation.
- The company has engaged in construction in Malaysia, Singapore, and Vietnam. In addition, the execution of a long-distance pipe jacking construction project with full-scale adoption of Japanese technologies in Myanmar has been determined this fiscal year.



TAMADA CORPORATION

[1st SME Category]

- **Business Description:** Design and production of underground tanks and fireproof water tanks
- **Overseas Business:** Vietnam
- **Company Introduction:** The company has a patent of a forming method in Japan. With the patented forming method, the company manufactures and sells double-wall tanks and licenses in lining treatment (layer laminated with fiber-reinforced plastic) of aged underground tanks. Through such activities, the company received orders on a continuous basis.

• Overview of Overseas Business:

- Based on a JICA-related project which adopted SF (steel fiber-reinforced plastic) double-wall tanks in Vietnam, Tamada established a local subsidiary in Vietnam and manufactures canned products including underground tanks and fireproof water tanks and sells them to Southeast Asian countries.
- The company manufactures and sells SF double-wall tanks and licenses technology for lining treatment of such tanks to non-Japanese manufacturers and contractors in ASEAN countries.



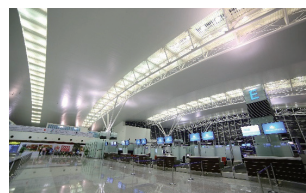
Jesco Holdings, Inc.

[1st SME Category]

- **Business Description:** Construction of electric facilities and telecommunication facilities
- **Overseas Business:** Vietnam, Singapore, and Malaysia
- **Company Introduction:** JESCO strategically expands its business in both design, integration, and construction through accurate risk management and receives substantial business in Asian regions.

• Overview of Overseas Business:

- Dispatch of engineers from Japan to the construction site for KLCC in Malaysia was an opportunity for JESCO for its full-scale business penetration into ASEAN countries.
- 2001 in Vietnam, JESCO established a subsidiary, which plays a Strategic role in its overseas business.
- JESCO conducted design, integration, and construction management, which were associated with construction of electric facilities and telecommunication facilities. The company received a number of orders which were mainly ODA-related infrastructure construction including construction of Noi Bai International Airport Terminal 2. Based on such track records, the company expanded its business to receive orders from the neighboring countries.
- In Vietnam, constructions of high-rise condominium are increasing in number. On this background, the company received a large-scale project of 760 million yen in 2017.



Yasuda Engineering Co., Ltd.

[1st SME Category]

- **Business Description:** General construction and propulsion works
- **Overseas Business:** South Korea, Taiwan, Vietnam, and Indonesia
- **Company Introduction:** Yasuda Engineering Co., Ltd. utilizes its excellent propulsion-method technology and business strategies to secure orders including a large-scale project of approximately 10.4 billion yen. At the same time, the company largely contributed to technical transfer to Vietnam organizations.

• Overview of Overseas Business:

- Japanese and Vietnamese governments signed a memorandum on technical cooperation regarding sewage technology in 2010. Based on the memorandum, Yasuda started its business expansion in Vietnam.
- Yasuda made presentations of its propulsion-method technology and created Vietnamese-version of codes and standards for the propulsion method. Through such activities, the company promoted spread of propulsion-method technology.
- Yasuda accepted technical interns, employ them after their return to Vietnam, and, in collaboration with local construction companies, provides personnel training. Through such activities, Yasuda largely contributes to technical transfer of its propulsion method.



TAIYU KENSETSU Co., Ltd.

[1st SME Category]

- **Business Description:** Road construction, pavement construction, and others
- **Overseas Business:** South Korea, China, Vietnam, Thailand, Malaysia, and Philippines
- **Company Introduction:** TAIYU KENSETSU developed excellent asphalt modifier for porous asphalt pavement, which were provisionally approved as new technology by Vietnamese government. With the provisional approval, the company received orders on a continuous basis.

• Overview of Overseas Business:

- The company started its overseas business from sales of its own technology and pavement material in 2000.
- The company sets asphalt modifier for porous asphalt pavement as main products, explained the products' excellent qualities and strong effectiveness as well as their production methods, offered and executed trial construction, and evaluated the results from the trials. Through such activities, the company was highly evaluated by Vietnamese government and companies, and then received a number of orders.
- The porous asphalt pavement using this asphalt modifier was provisionally approved as new technology by Vietnamese government in 2016. Then, the company offered and executed trial construction in Thailand and Malaysia and those trials were highly evaluated.



Sakai Heavy Industries Ltd.

[1st SME Category]

- **Business Description:** Manufacturing and sales of heavy construction equipment
- **Overseas Business:** Indonesia, United States, China, Thailand, and Bahrain
- **Company Introduction:** Sakai Heavy Industries manufactures and sells excellent heavy construction equipment and machinery. The company has a business style that it expands its sales routes while offering technical guidances locally.

• Overview of Overseas Business:

- Sakai manufactures and sells road rollers, stabilizers, and road cutters as its main business. The company started its export business from export of road rollers to Thailand in 1935. Then, after 1950s, the company exported road rollers mainly to Asian countries including Philippines.
- Thereafter, the company established manufacturing/sales bases in Indonesia, United States, China, and other countries to sell its products to more than 130 countries through its networks of over 100 worldwide agencies.



NISSAKU CO., LTD.

[2nd Construction Project Category]

- **Project name:** The Project for Safe Water Supply and Improvement of Hygiene Conditions in Rural Areas
- **Country of the Location:** Senegal
- **Project overview:**

- This project provided water supply facilities to use safe groundwater and sanitation facilities in rural areas in Senegal where basic infrastructure, such as electricity and water, was insufficient.
- New construction of water supply facilities, including deep well drilling, pumping facilities, long-distance gravity-based water supply pipes using elevated water tanks, and various types of water faucets for public use.
- Administrative officers and local residents were taught to perform light repairs, etc. with the aim of continuous maintenance. The project contributed to improving habits and sanitation in public restrooms and at handwashing locations installed in schools and medical facilities.



NIKKEN KOGAKU CO.,LTD.

[2nd SME Category]

- **Business Description:** Development and sales of disaster management technology
- **Overseas Business:** Korea, Vietnam, Indonesia
- **Company Introduction:** NIKKEN KOGAKU CO.,LTD. established a business development scheme of promoting of technologies in local markets through verifying effectiveness of its technology by using network among local universities and researchers.

• Overview of Overseas Business:

- NIKKEN KOGAKU CO.,LTD. established its business style in mid-long term perspectives, through assessing and evaluating the wave dissipating block technology to prove its advantage, thus contributing to enhancing its recognition and business activities by collaboration with local universities and research institutes.
- In 2012, a representative office was established in Hanoi, Vietnam. Its own technology was registered as the National Standard of Vietnam (TCVN) through performance evaluation jointly conducted with Water Resource University in Vietnam. It was applied at a large scale project, such as Nghi Son Refinery development project.
- NIKKEN KOGAKU CO.,LTD. has spread their products which emphasize life-cycle cost by using toughness and resilient structure. In FY2018, work expanded in Vietnam with a roughly 157-million-yen order for the “Chan May Port Breakwater” Project.



Overseas expansion support for small and medium-sized construction enterprises (SMEs)

The Ministry of Land, Infrastructure, Transport and Tourism established the Japan Association of Small and Medium-sized Enterprises for Overseas Construction (JASMOC) on June 12, 2017 for the purpose of assisting SMEs with overseas expansion.

Purpose of JASMOC

Some small and medium-sized construction enterprises (SMEs) in Japan whose unique skills and technologies would be well received abroad and that are keen to expand into international markets are hesitant to do so due to a lack of the necessary knowledge and know-how. To remedy this, JASMOC collaborates with corporations, industry groups, expert advisors and support organizations such as government-affiliated agencies and financial institutions. Its activities include sharing important information and issues related to overseas expansion and hosting seminars to promote greater utilization of support measures provided by relevant organizations.

Composition of JASMOC (as of March 2021)

- Member companies: 226 small and medium construction enterprises
- Member organizations, etc.: 12 industry groups, etc.
- Advises: an university professor, 4 SME management consultants, etc.
- Supporter: 97 organizations

Government-affiliated agencies: JICA, JETRO, Small and Medium Enterprise Agency, Organization for Small & Medium Enterprises and Regional Innovation, Ministry of Foreign Affairs, Ministry of the Environment, diplomatic establishments abroad, etc.

Financial institutions: Banks, credit banks.

Etc.

Activities

Overseas expansion seminar

Share information for overseas expansion, introduce examples of companies that have actually expanded overseas, provide information from support organizations, and share advanced information of overseas delegation before dispatching

Dispatching overseas delegation (consists of MLIT and SMEs)

- Visit local governments, local Japanese construction companies, and construction sites
- Promote SMEs construction technologies
- Conduct business matching with local construction companies
- Host Job fair with cooperation of local university

(Past dispatched countries: Vietnam, Philippine, Cambodia)

JASMOC General meeting

Review past JASMOC activities and share actions of next fiscal year

Subcommittees of individual issues

Consider individual issues for business expansion and share related information

Collection of Construction Technologies

Introduce excellent construction technologies of JASMOC members inside and outside Japan so that they could expand their business overseas

JASMOC newsletters

Regularly send JASMOC newsletters with support menus from support organizations and related information for overseas expansion

Past Activities



Overseas expansion seminars in Tokyo and Okinawa



Business matching in Hanoi



Job fair in Ho Chi Minh

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Collection of Construction Technologies

—The World-Class Technologies of Japanese Small and Medium-sized Construction Companies—

Published July 2021

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JASMOC

Japan Association of Small and Medium-sized enterprises for Overseas Construction



MLIT

Ministry of Land, Infrastructure, Transport and Tourism

July 2021