Construction Revolution

Overcomes restrictions on working space to build a continuous pressed-in pile wallwithout constructing temporary facilities

Non-Staging Method

GIKEN

Introduction

In construction projects, provisional facilities, such as temporary piers, work platforms, and so on, have generally consumed a great deal of money, time and energy, accounting for around 70% of the total construction costs, with only 30% being spent on the target structure.

But the "Non-Staging Method" solves the problem of wasteful temporary measures, by harnessing the superiority of the press-in principle. This method is based on the "GRB system" which uses the top of completed piles as a work platform to carry out all the steps of the press-in procedure - transporting the pile, pitching the pile and pressing it in. All of the machinery in the system supports itself by gripping installed piles, which means there is no risk of overturning. Also, the area affected by the work is restricted to the width of the actual machine, so various restrictions on the working space can be overcome.

This method has no need at all for temporary facilities, such as piers or roadways, even when working over water, on sloping or uneven ground, in narrow spaces, or with restricted headspace. Freed from these temporary measures, the construction work can focus efficiently on the actual objective, which is building the intended structure. In this way, the Non-Staging Method achieves a truly excellent balance between the Five Construction Principles: Environmental Protection, Safety, Speed, Economy and Aesthetics.

Flood Control Work in a residential area using the Non-Staging Method

Contents

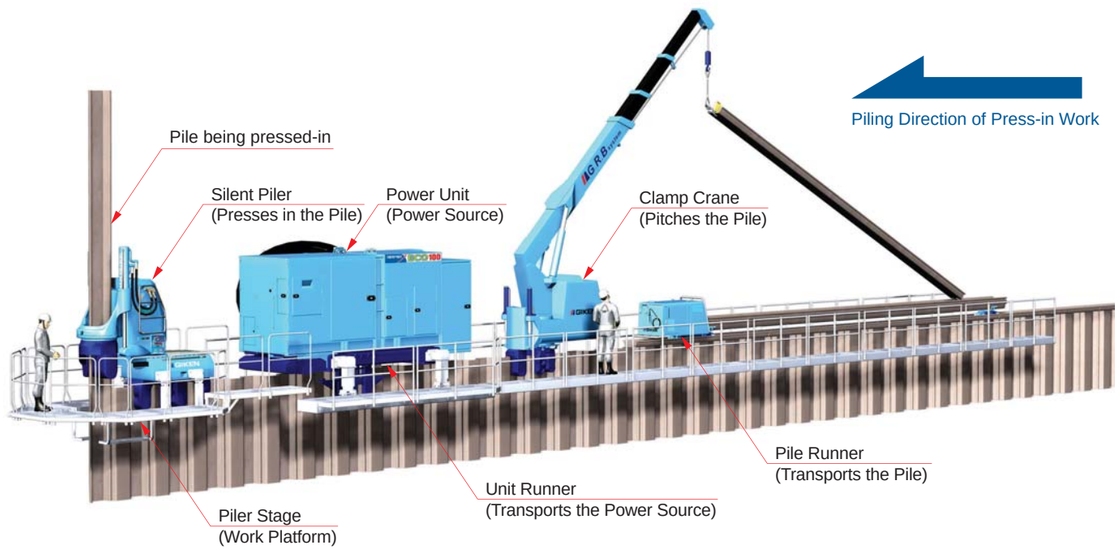
Overview of Non-staging Method

A construction system that does away with temporary installations, and the waste they cause in the construction process, and overcomes work space restrictions.

The Non-Staging Method employs the "GRB system" in which all of the equipment involved in the press-in work advances along the top of the installed piles. This removes the need for wasteful temporary structures, so that all of the work is focused efficiently on the wall structure, which is the actual objective. Because the system is light and compact, it doesn't obstruct water flows or traffic, even when used in water course improvements or trackside construction work in built-up areas, or road widening on busy highways, etc. This saves both time and money.

Standard Components of GRB system

The GRB system is composed of the press-in machine main body, which is the key element that presses the pile into the ground, accompanied by a power unit providing a source of hydraulic power, a unit runner to move the power unit, a clamp crane to pitch the pile, and a pile runner to transport the pile from the work base.



Without using any temporary structures, a revetment is built with an implant structural design of piles that are integrated with the Earth.

Non-Staging Method

No Effect on Water Flow or Neighbouring Area

Conventional Excavation Method

Water Flow and Water Traffic Cut Off, Oppressive Effect on Surroundings

Features of Non-Staging Method

◇ No Temporary Structures are Required

With this system, piling work is carried out on top of installed piles, so no temporary pier is necessary. (Saves Time and Costs)

◇ Work is Possible in Tight Conditions where Conventional Methods are Difficult

The compact size of the system makes it perfect for working in tight conditions, e.g. over water or on sloping ground.

◇ Respectful of the Surrounding Area

The press-in method uses static load, so it hardly creates any noise or vibration. The area affected by the press-in work is restricted to the width of the machinery only, thus protecting the surrounding area.

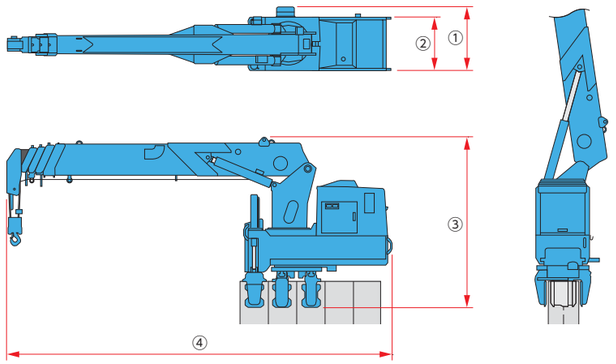
◇ Excellent Safety with No Risk of Overturning

The press-in machine, clamp crane, and other system equipment are designed to grip firmly onto completed piles, which means there is no risk of overturning.

Construction works can be carried out with Environmentally-friendly considerations, lower cost and shorter work duration at any work conditions.

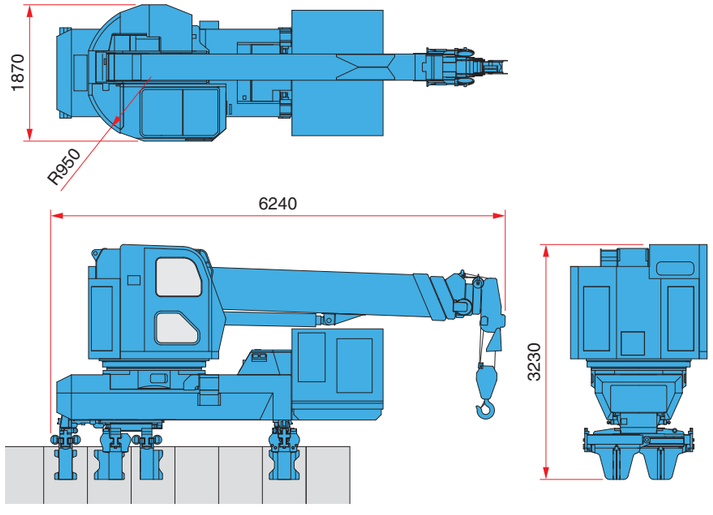
System Equipment

Clamp Crane CB1



Models	CB1-7	CB1A	CB1B
Crane Capacity	2.93 ton × 4.5 m	2.95 ton × 5.0 m	2.95 ton × 5.0 m
Max. Working Radius	12.0 m	15.67 m	15.67 m
Compatible Piles	U Sheet Pile 400-600 Pitch Hat Sheet Pile 900 Pitch Zero Sheet Pile (NS-SP-J) Concrete Sheet Pile KF100～150H	U Sheet Pile 400-600 pitch Hat Sheet Pile 900 Pitch	U Sheet Pile 400-600 Pitch Hat Sheet Pile 900 Pitch
Mass	4500 kg	5170 kg	5200 kg
① Width	960 mm	960 mm	1000 mm
② Main Body Width	810 mm	810 mm	900 mm
③ Height	2475 mm	2475 mm	2570 mm
④ Length	5670 mm	5690 mm	5800 mm

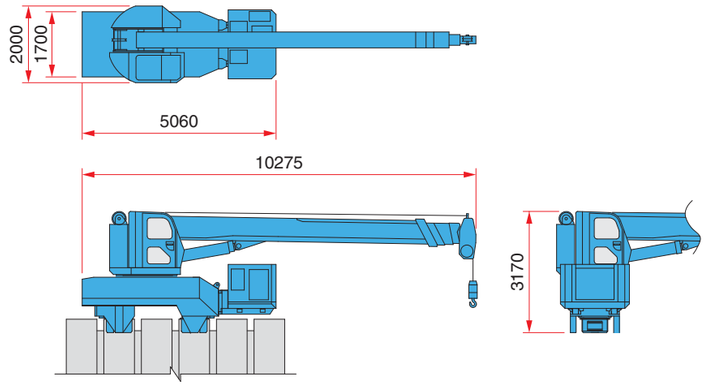
Clamp Crane CB2



Models	CB2
Crane Capacity	2.9 ton × 6.0 m
Max. Working Radius	22.6 m
Compatible Piles	U Sheet Pile 400-600 Pitch Hat Sheet Pile 900 Pitch
Mass	12500 kg

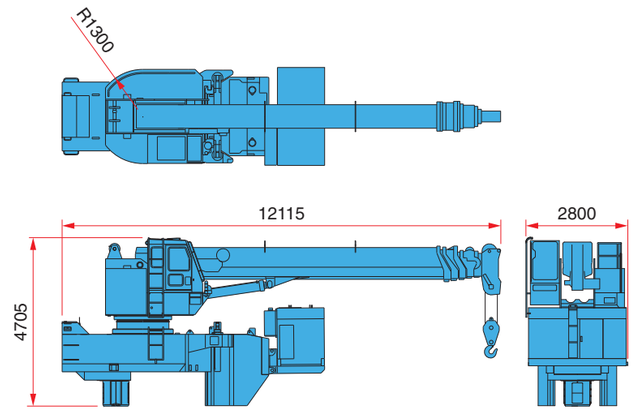
* Product specifications may be changed without prior notice.

Clamp Crane CB3



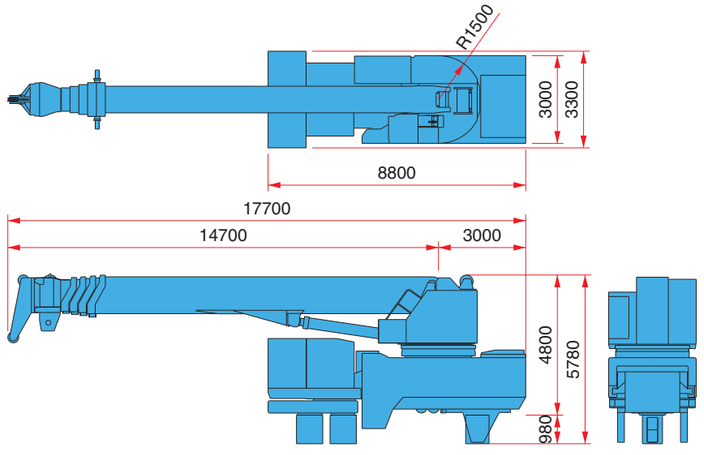
Model	CB3
Crane Capacity	10.0 ton × 6.5 m
Max. Working Radius	30.0 m
Compatible Piles	Tubular Sheet Pile ϕ700-900
Mass	18800 kg

Clamp Crane CB4



Model	CB4
Crane Capacity	20.0 ton × 7.0 m
Max. Working Radius	34.0 m
Compatible Piles	Tubular Sheet Pile ϕ800-1500
Mass	46300 kg

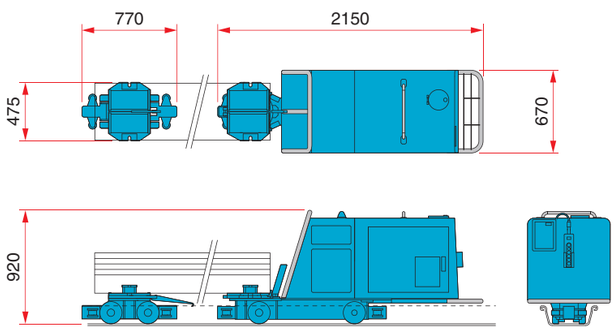
Clamp Crane CB5

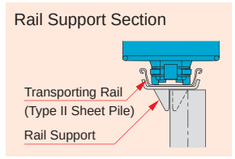


Model	CB5
Crane Capacity	50 ton × 12 m
Max. Working Radius	47.0 m
Compatible Piles	Tubular Sheet Pile φ800-1500
Mass	130000 kg

* Product specifications may be changed without prior notice.

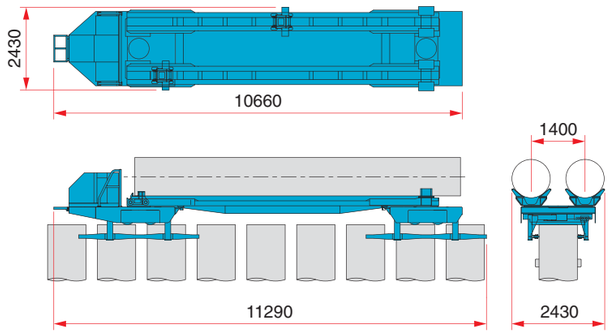
Pile Runner PR1 (For Sheet Piles)





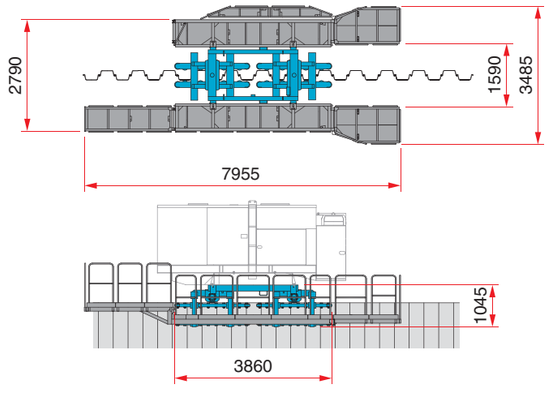
Model	PR1
Carrying Capacity	5.0 t
Mass	Towing Rig 645 kg
	Carriage 140 kg
Compatible Piles	U Sheet Pile 400-600 Pitch Hat Sheet Pile 900 Pitch Zero Sheet Pile (NS-SP-J) Concrete Sheet Pile 500 Pitch
Transporting Rails	U Sheet Pile II
Total Mass	785 kg

Pile Runner PR217 (For Tubular Sheet Piles and Tubular Piles)



Model	PR217
Carrying Capacity	15.0 t
Compatible Piles	Tubular Sheet Pile ϕ700-1200 mm
Transporting Rails	N/A
Total Mass	8900 kg

Unit Runner UR3, Stage ST17 (For UR3)



Model	UR3
Travel Speed	10 m/min.
Min. Turning Radius	11 m
Max. Climbable Step	30 mm
Compatible Piles	U Sheet Pile 400-600 Pitch Hat Sheet Pile 900 Pitch
Mass	2350 kg
Model	ST17 (for UR3)
Mass	720 kg
Total Mass	3070 kg

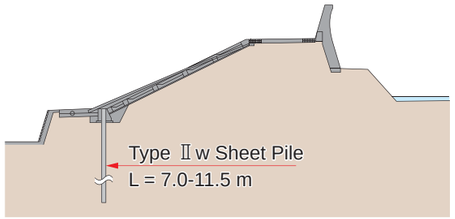
* Excluding Power Unit

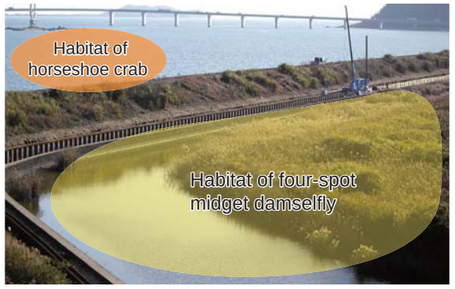
* Product specifications may be changed without prior notice.

U Sheet Piles

Reference	Improvement Work for Coastal Protection Facilities (Tidal Surge Protection), Kitanoe Aihara District, Embankment Strengthening Project No. 2	Yamaguchi Prefecture

No temporary platform required, resulting in shorter timeframe and reduced costs. Rapid completion with no impact on the ecosystem, working on the inside of an embankment in an area inhabited by endangered species.



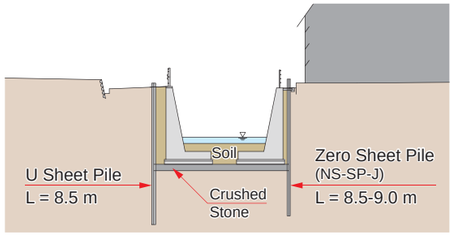


Zero Sheet Pile (NS-SP-J)

* "NS-SP-J" is a sheet pile made by Nippon Steel and Sumitomo Metal.

Reference	Route 10-1-3 Kandagawa District, River Repair Work	Kochi Prefecture

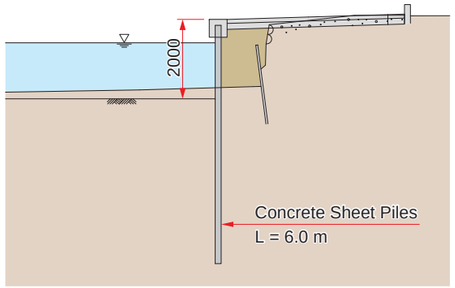
Using the GRB system with its safe and compact machinery, the distance between the sheet pile retaining wall and the houses was minimized to ensure the largest possible water course.



Concrete Sheet Piles

Reference | Hiraishiebisuno District, Drainage Channel Section 1 | Tokushima Prefecture

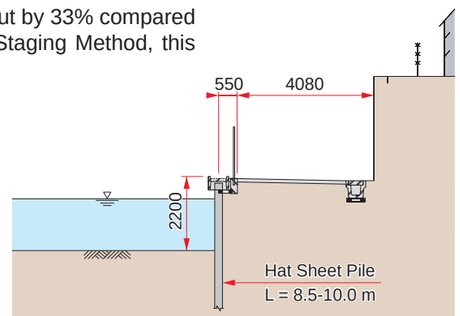
By adopting the Non-Staging Method with pre-fabricated concrete sheet piles, the effects on the surrounding area are minimized, and the work time is shortened.



Hat Sheet Piles

Reference | Akaike Revetment Construction Work | Ibaragi Prefecture

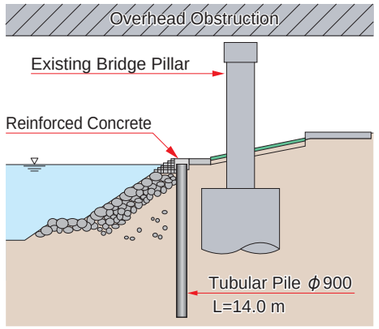
Due to the effective pile width of 900 mm, the number of piles was cut by 33% compared to wide sheet piles (600 mm), and when combined with the Non-Staging Method, this brought cost savings and faster completion.



Tubular Sheet Piles

Reference | Ujigawa Bridge No. 1 Revetment Repair Work | Kyoto Prefecture

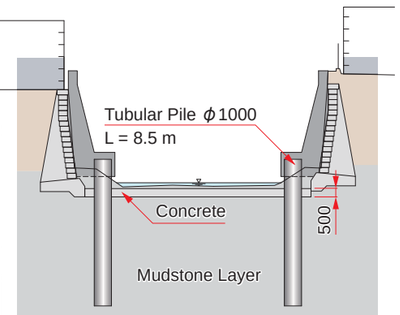
The compact equipment built a highly rigid and durable revetment without obstructing traffic



Tubular Piles

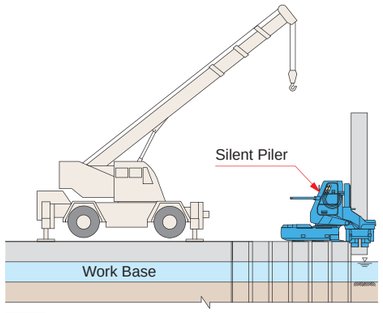
Reference | Furukawa River Channel Repairs (1) | Tokyo

Tubular piles pressed into mudstone and concrete layer. Work completed in narrow space without vibration and noise, leaving the surrounding houses and apartment blocks unaffected.

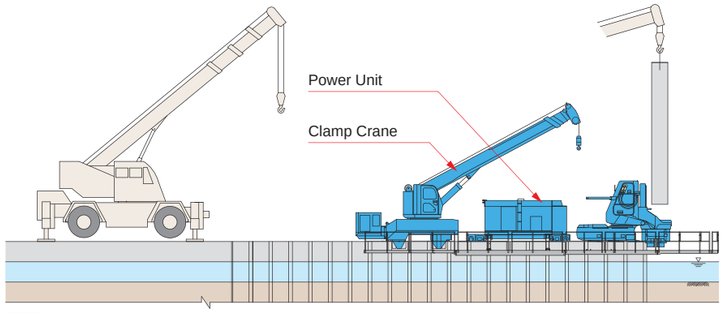


Standard Press-in Procedures

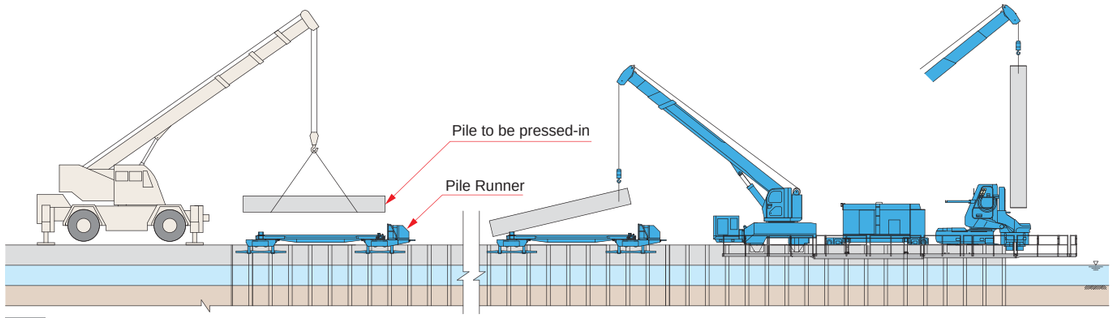
Press-in Procedures Diagram



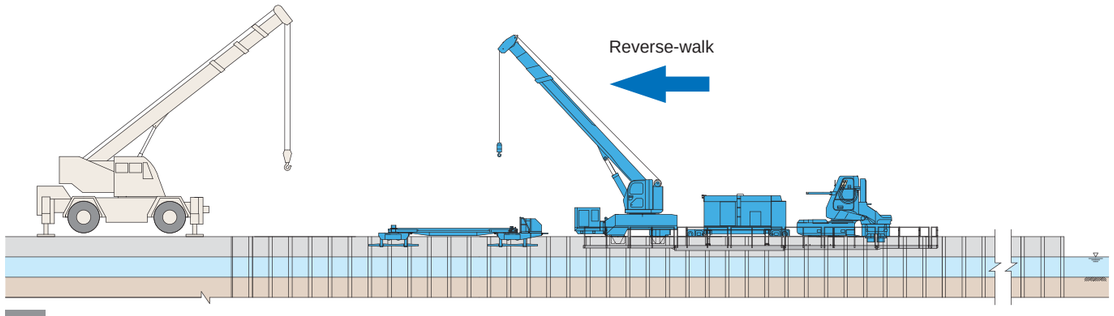
1 The press-in machine main body is set in position and press-in work is started.



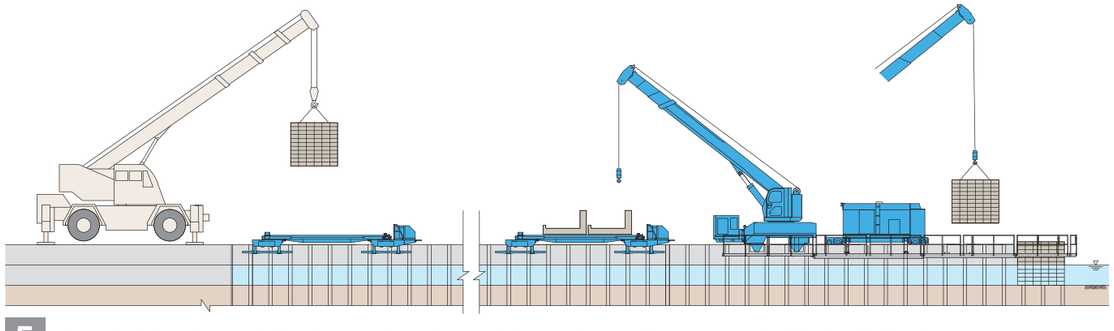
2 When a specified number of piles have been pressed in, the power unit, and clamp crane are moved from the work base and set up on top of the completed piles.



3 Pile runners are laid down and piles are transported to the next installation point.



4 When pile installation is completed, the assembly reverse-walks back to the work base.

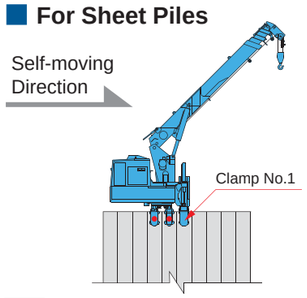


5 Precast reinforced concrete / fronting panels are transported on continuous pile runners, and set in place by the clamp crane.

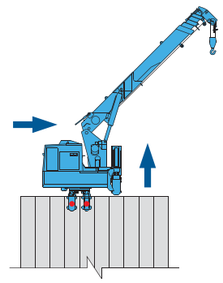
Clamp Crane Self-moving Diagram

● symbol indicates that the pile is gripped by the clamp and chuck.

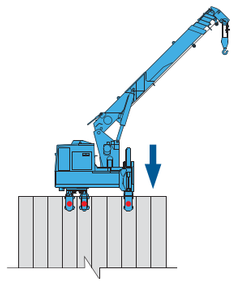
For Sheet Piles



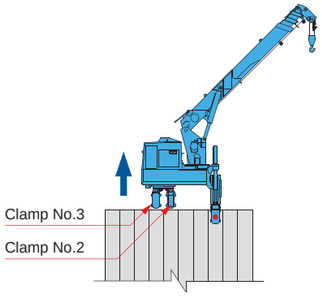
1 Clamp No.1 is opened.



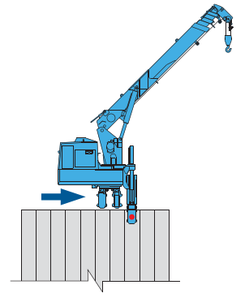
2 Clamp No.1 is raised and the crane body is moved forwards.



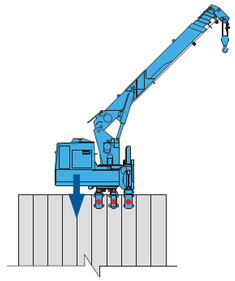
3 Clamp No.1 is lowered and closed.



4 Clamps No.2 and 3 are opened and raised.

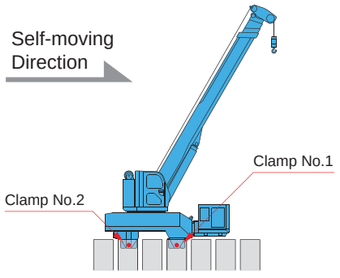


5 Clamps No.2 and 3 are moved forwards.

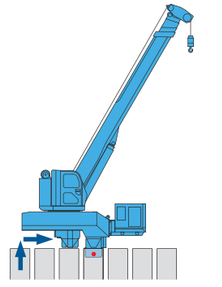


6 Clamps No.2 and 3 are lowered and closed, and the self-walking procedure ends.

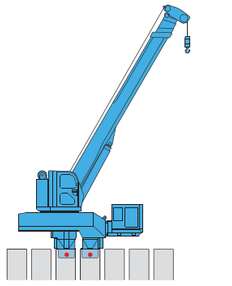
For Tubular Sheet Piles



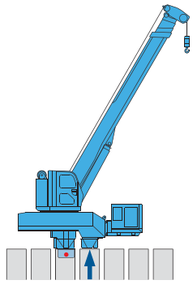
1 Boom raised.



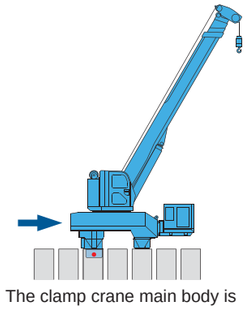
2 Clamp No. 2 is opened and raised, and the equipment is moved forwards.



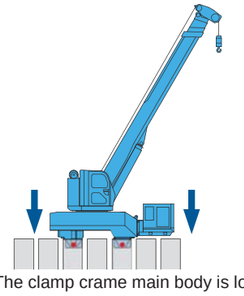
3 Clamp No. 2 is lowered and closed.



4 Clamp No. 1 is opened and raised.

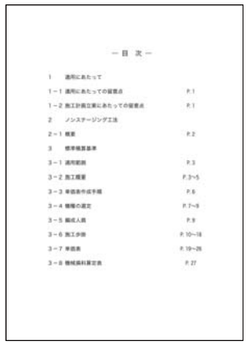


5 The clamp crane main body is moved forwards.



6 The clamp crame main body is lowered and the self-moving procedure ends.

The technical data published by the Japan Press-in Association can be applied to the Non-Staging Method.



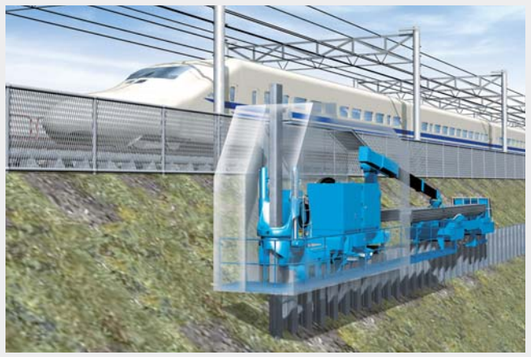
Standard technical data can be downloaded from the Association's website.

http://www.atsunyu.gr.jp

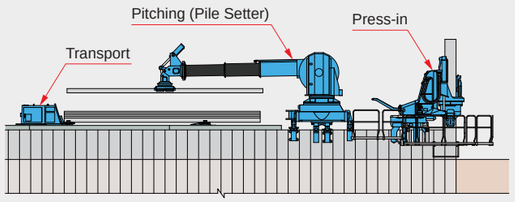
Introducing Technology

Rail Safe System

The Rail Safe System can of course be implemented near railway tracks, and due to the superiority of the Press-in Principle, piles can be installed at great speed, without any temporary structures, while maintaining a normal train schedule and ensuring the safety of railway traffic. Using the EMOS Eco Monitoring System (p. 12), every detail of the work environment can be monitored scientifically, even in locations with very strict safety requirements, such as Shinkansen tracks.

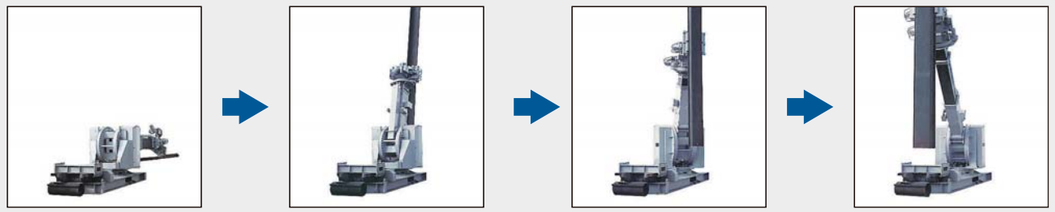


■ Equipment Layout



The innovative pile pitching action of the GRB system, using the pile setter, means even better work safety.

Movements of the Pile Setter



① Grips the pile to be pressed in
② Lifts the pile
③ Turns the pile to the press-in alignment
④ Pitches the pile in the piler

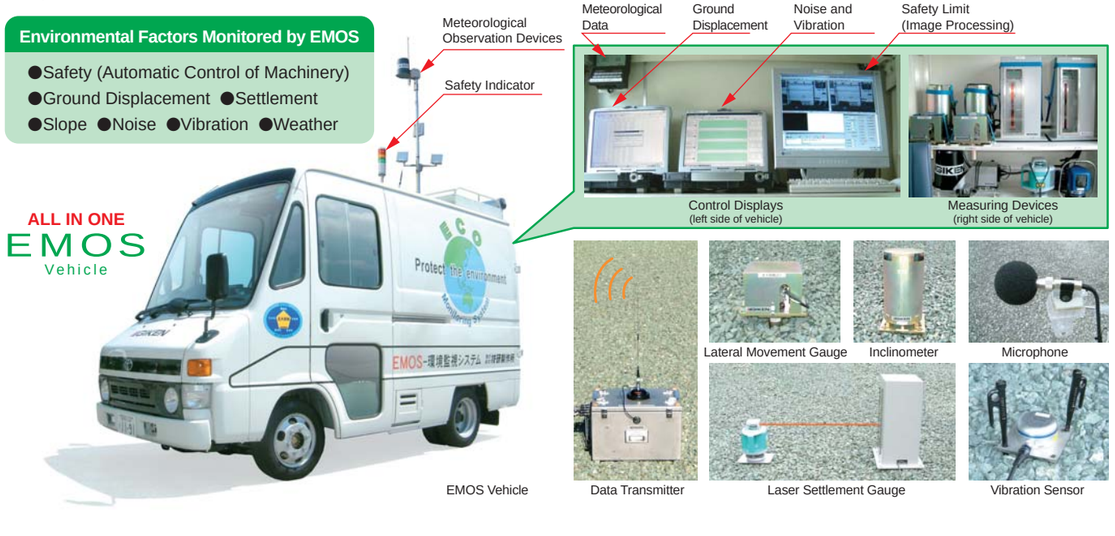
EMOS Eco Monitoring System

Monitoring the behaviour of the machinery during construction and the accomplishment of reliablesafety within regulatory standards

EMOS : The Eco Monitoring System (EMOS) is an immensely flexible environmental monitoring set-up with all the necessary measuring equipment mounted in a single custom-designed vehicle. The technical data provided by EMOS gives a scientific demonstration of the superiority of the construction method and the safety and reliability of the procedure, which can be shown to clients, local residents and other interested parties.

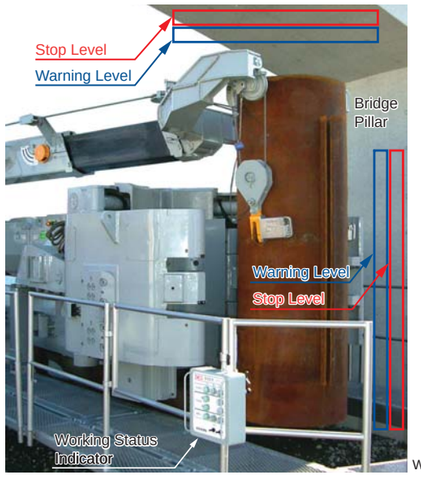
Environmental Factors Monitored by EMOS

- ●Safety (Automatic Control of Machinery)
- ●Ground Displacement ●Settlement
- ●Slope ●Noise ●Vibration ●Weather



Construction machinery stopped automatically by image data processing (Systematic Control of Safety)

EMOS uses camera monitoring equipment and image processing to automatically control the operations of the construction machines, so that work is carried out within the established safe area. This safety control system enables fast and cost-effective work that makes maximum use of the space inside the clearance limits, while ensuring excellent safety with regard to nearby structures, cables, and railway and road traffic.



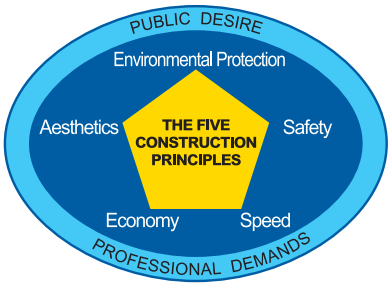

Monitoring Camera


Safety Monitor


Working Status Indicator

- A warning level and stop level can be set in each of four areas
- A warning or automatic stop is implemented, depending on the effect on existing structures
- An image is recorded on the management computer whenever there is an abnormality in the warning and stop level detection

THE FIVE CONSTRUCTION PRINCIPLES



If we analyse all the parties involved in any construction work, we can categorise them into three main groups: the client, the contractor and the general public. The ideal situation is when all three parties are in agreement and satisfied with the successful outcome of the construction work. Problems arise when one of the parties becomes a victim of imbalance in this relationship. The conventional construction methods based upon principles that "more is paid for less efficient work" are no longer appropriate to present-day society. Universally acceptable construction methods must embody the Five Construction Principles.

Environmental Protection	Construction work should be environmentally friendly and free from pollution.
Safety	Construction work has to be carried out in safety and comfort with a method implementing the highest safety criteria.
Speed	Construction work should be completed in the shortest possible period of time.
Economy	Construction work must be done rationally with an inventive mind to overcome all constraints at the lowest cost.
Aesthetics	Construction work must proceed smoothly and the finished product should portray cultural and artistic flavour.

GIKEN **Construction Solutions Company** www.giken.com

GIKEN LTD.
International Business Department
3948-1 Nunoshida, Kochi-shi, Kochi 781-5195, Japan
Tel. : +81-(0)88-846-2980 Fax : +81-(0)88-826-5288
Email : international@giken.com

Global Network : Japan, UK, Germany, USA, Singapore, China

For more contact information, please visit:
http://www.giken.com/en/contactus/groupcompanies

Ver 2.0EN01 / 28 Feb 2014