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News Letter

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Editorial Board

Messages
From the New Director

Mark Albert H. Zarco

Professor, Institute of Civil Engineering
University of the Philippines Diliman

In recent years, there has been increased interest in the Philippines in new and novel ground improvement methods and foundation systems due to the demand for land suitable for urban development. However, in order for such methodologies to gain widespread use, they need to satisfy a number of requirements. First, they need to be based on sound engineering principles. Second, the materials and equipment required by these methods should be readily available. Third, there should be proper training of construction personnel in the method. Fourth, these methods need to be cost-effective in order to ensure the economic viability of the project. Finally, these methods also need to result in structures that are disaster resilient. This last factor is particularly important given the often-challenging geotechnical conditions underlying most construction sites together with the exposure to multiple hazards.

One such method that appears to be promising is the Press-in piling installation. Since the initial seminar in May 2019 organized by IPA, the PSSMGE, and UP ICE, and sponsored by GIKEN LTD., Nippon Steel and Sumikin Bussan with the local support of AMH Philippines, there has been renewed interest in the Press-in piling installation methodology as a viable alternative to the popular approach of using driven pre-cast concrete piles or cast-in-place concrete piles and drilled piers. Furthermore, Press-in pilling installation offers several benefits over the more traditional installation methodologies with respect to ease of construction, as well as reduced noise and pollution.

I consider being a member of the IPA board both as an honor and a responsibility. As a board member, I look forward to serving IPA by creating greater awareness, acceptance, and advocacy of the press-in-pile installation methodology in the Philippines through my involvement in academe as well as professional engineering organizations. At the same time, I foresee that doing so will involve identifying, through focus group discussions with key stakeholders in the construction industry, factors that hinder the more widespread use in the Philippines of Press-in piling installation. By identifying these factors, the IPA will be better prepared in formulating strategies for effectively promoting the Press-in piling installation system.

◆ A brief CV of Prof. Mark Albert H. Zarco

Mark Albert H. Zarco is a professor and head of the Geotechnical Engineering Group, Institute of Civil, University of the Philippines Diliman. He currently serves as the president of the Philippine Society of Soil Mechanics and Geotechnical Engineering, chairman of the Geotechnical Specialty Division of the Philippine Institute of Civil Engineers, and vice chairman of the Committee on Soils and Foundations of the Association of Structural Engineers of the Philippines of which he is an honorary member. His research interests are in the area of computational geomechanics as well as the assessment and mitigation of risk associated with geotechnical hazards.

Messages
From the New Director

Katsutoshi Ueno

Associate Professor, Dept. of Civil and Environmental Engineering
Tokushima University

It is my great pleasure to write a message for this IPA Newsletter. I am Katsutoshi Ueno, a new director, and an associate professor at the Geotechnical Engineering Laboratory of Tokushima University. It takes about 2 hours by car from Tokushima University to GIKEN LTD. Tokushima Prefecture is a neighboring prefecture to Kochi Prefecture, where GIKEN LTD. is located and belongs to the same Shikoku region.

My major field of occupation is “Disaster Science and Mitigation”. My research interest focuses on geotechnical model tests in gravitational or centrifugal force fields for the deformation and failure of ground: for example, foundations, earth structures, retaining structures, and underground cavitation due to repeated immersion.

One of the features of my research technique is deformation measurement based on precise image analysis developed by myself. In addition, I innovated a precise, high-resolution (3fF) and wide-ranged (32bit) capacitance meter to develop methods for early detection of underground cavitation due to repeated water immersion.

I participated in TC3 in the activities of IPA. I also served as an organizing committee member and the chair of the scientific working group of ICPE2018 and ICPE2021. I would like to express my sincere gratitude to all the members for their cooperation in the submission of papers, peer review, participation and discussions at the conference. I would also like to thank the members of the executive committee for their efforts in organizing the conference. I would like to take this opportunity to thank you again.

Shikoku Region is exposed to a potentially large-scale disaster. Kochi Prefecture and Tokushima Prefecture are often attacked by typhoons, and the annual rainfall exceeds 3,500mm and 2,500mm, respectively. On the other hand, cities are developed in soft lowland areas consisting of floodplain of raging rivers, as the place names of “Kochi” and “Kawauchi'' indicate: these names mean “inside of river”. In addition, there is concern about the occurrence of huge trench-type earthquakes and high tsunamis.

Shikoku Region is an area where press-in engineering is expected to play a major role as a construction technology for structures that support national resilience, such as levees, seawalls and breakwaters. I have been the representative of the Geotechnical Study Group in Tokushima since 2017. In 2021, I served as the branch manager of Shikoku Branch of the Japanese Geotechnical Society. This time, I was appointed as a director of IPA, and I will be involved in international activities in addition to the activities in the region so far. As a director of IPA, it gives me great pleasure to be able to contribute to the development of press-in technology and disaster prevention.

◆ A brief CV of Associate Prof. Katsutoshi Ueno

Katsutoshi Ueno is an associate professor of Geotechnical Engineering in the field of Disaster Science and Mitigation, Department of Civil and Environmental Engineering, at the Graduate School of Technology, Industrial and Social Sciences, of Tokushima University. He is the director of the Laboratory of Geotechnical Engineering.
He graduated from Hokkaido University, Japan in 1989, and obtained his Master of Engineering in 1991. He worked as a research associate at The University of Utsunomiya from 1991 to 1998. Then he moved to Tokushima University. In 2001, he received the degree of Doctor of Engineering from the Tokyo Institute of Technology. His research interests are in the fields of deformation and stability problems of Geo-structures, such as shallow foundations, retaining structures and unexpected underground cavities.

Special Contribution

The technological transition of steel pipe piles, tubular sheet piles, and steel sheet piles

Tomoyuki Suzuki

Japanese Association for Steel Pipe Piles

The current technology of steel pipe piles, tubular sheet piles, and steel sheet piles has been developed through continuous efforts with trial and error by various parties concerned to meet the demands of the times. On the occasion of the 50th anniversary of the Japanese Technical Association for Steel Pipe Piles and Sheet Piles in August 2021, the technological transition of steel pipe piles, tubular sheet piles, and steel sheet piles from the end of World War II to the present was compiled. In this article, I would like to briefly introduce the transition from the aspects of product, construction, and design.

1. From wood to steel

(1) Shift from wooden piles to steel piles

Table 1 shows the major changes in steel pipe piles, tubular sheet piles, and steel sheet piles from the post-World War Ⅱ period to the present. Before the war, the mainstream of foundation piles in Japan was wooden piles, mainly pine piles.

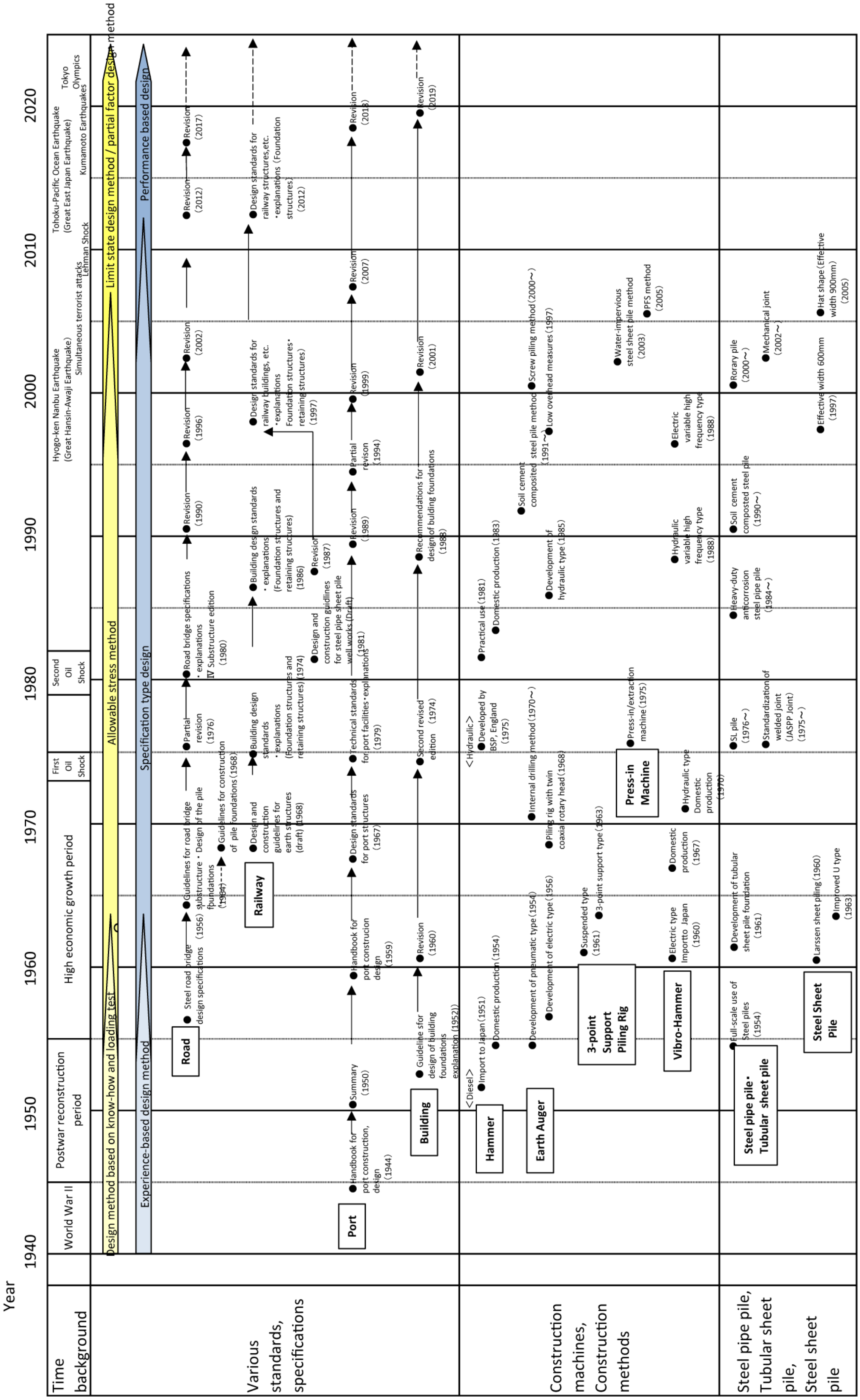
Under such circumstances, in 1954 after the war, the Second Port Construction Bureau of the Ministry of Transport (currently the Tohoku Regional Development Bureau of the Ministry of Land, Infrastructure, Transport, and Tourism) used steel pipes as foundation piles at the Shiogama Port pier. Since this case, during the period of high economic growth when urban development and social capital development rapidly progressed, a large number of steel pipe piles became to be used as foundations for road bridges and buildings, including port structures[1] . This was due to the depletion of timber as well as the protection of natural resources[2], but in addition to the fact that precious steel materials which had been used for military purposes during the war became to be distributed to the market, in Japan which is an earthquake-prone country, in response to the needs for urban formation (construction of large heavy structures, securing of seismic structures) mainly in coastal areas with a lot of soft ground, it was considered that the features of the steel pipe piles were suitable for construction with longer piles because the stiffness of steel materials was higher than that of wooden piles, and the horizontal resistance and bearing capacity were also large.

Steel pipe piles have been developed according to the application to meet various construction conditions. For example, in the 1970s, SL piles (Photo 1) were developed against the negative skin frictional force that tended to occur in soft ground and landfills. SL piles are piles in which a special asphalt (Slip Layer compound) was applied to the surface of a steel pipe as a slip layer, and the slip layer material behaves like a viscous body under a load that acts over a long period. However, it has the property of behaving like an elastic body (viscoelastic property) against a load acting in a short time. In addition, in the 1980s, the problem of corrosion of steel structures that had been constructed up to that point became apparent, so the development of various corrosion countermeasure technologies, including heavy-duty anticorrosion steel pipes (Photo 2), began at full scale.

Photo 1 SL Piles[3]

Photo 2 Heavy-duty anticorrosion steel pipe pile with polyethylene coating (Black part is the covering material)

Table 1 Major changes in steel pipe piles, tubular sheet piles and steel sheet piles



In the 1960s, the development of tubular sheet pile foundations using tubular sheet piles as well as steel pipe piles started. The tubular sheet pile foundation is an elastic foundation, where the tubular sheet piles are installed in a good quality bearing layer in a combination of circular, oval, or rectangular closed shapes, the inside of the junction pipe is filled with mortar, and its head is rigidly bonded by the top plate so that horizontal resistance and vertical bearing capacity to design loads can be obtained (Fig. 1). The idea of the tubular sheet pile foundation originated from the construction of bridge foundations and dolphins by the Paine Company in the former West German using Box Pile called Paine Pile in 1930. Development of this foundation started in 1961, in 1967 as a large blast foundation, and in 1969, it was first adopted for the Ishikari Kakoh Bridge as a bridge foundation.

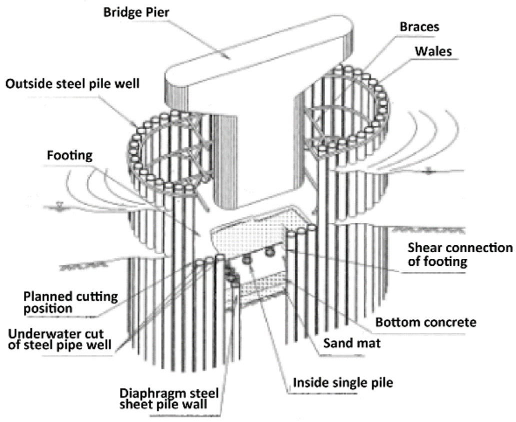


Fig. 1. Schematic diagram of tubular sheet pile foundation for temporary cofferdam

(2) Shift from wooden sheet piles to steel sheet piles

As with steel piles, wooden sheet piles made of pine wood were mainly used in the early days. Wooden sheet piles had many drawbacks, not only in terms of cross-sectional strength and durability but also in that it took time to process the part that was to be the interlock and that the interlocked part was not tightly sealed, therefore it was mainly used for earth retailing of small-scale excavation construction. In the 1930s and 1940s, as the scale of construction work increased, high-rigidity earth retaining walls became necessary, and the sheet pile construction methods using reinforced concrete were often used for small quays and river revetments in many cases. Even in the case of reinforced concrete sheet piles, it was difficult to secure the water tightness of the interlocks as in the case of wooden sheet piles, so there were also inconveniences such as that it was not suitable for places where water flowed in and out, and that a large machine was required for construction. Steel sheet piles emerged as materials with features such as "high strength, workability, rapid construction, and tightness of interlocks" that would make up for some of the shortcomings of wooden sheet piles and reinforced concrete sheet piles.

Photo 3 Hat-shaped steel sheet pile[6)]

In 1923, the Great Kanto Earthquake struck Japan, causing great damage. A large number of steel sheet piles were imported from all over the world for quick recovery from the disaster (especially in the harbor and river fields). This incident is considered to be a breakthrough in the steel sheet pile method [5)]. In 1931, the steel sheet piles with an effective width of 400 mm were produced for the first time in Japan, and they were widely used for the promotion of port facilities during the postwar reconstruction period. In the 1960s, steel sheet piles with an effective width of 500 mm were developed, and in the 1990s, wide steel sheet piles with an effective width of 600 mm were developed. In 2005, to respond to speeding up of public works, cost reduction, and labor-saving, manufacturing of the hat-shaped steel sheet piles (Photo 3) with an effective width of further widened 900 mm widths was started.

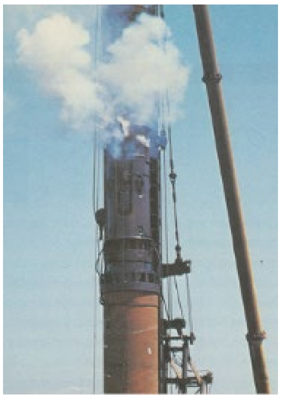
2. Technical transition of construction method and construction management

(1) Impact Driving Method

As with steel sheet piles, the method of driving steel pipe piles was mainly Impact Driving Method. Before the 1970s, it was common to drive piles and sheet piles by driving with human power, and a drop hammer (Monken) was used to lift the weight with a winch or the like and let it fall freely (Photo 4 (a)) [1)] After the 1890s, drop hammers powered by steam engines were introduced to Japan, and steam hammers were domestically produced in 1929 [7)]. Since the steam hammer (Photo 4 (b)) used steam or compressed air as the driving power source, it had the features that the construction speed was faster and the driving force could be adjusted compared to the construction by free fall using the drop hammer. After World War II, due to the development of a diesel hammer (Photo 4 (c)) with even higher construction capacity, this became the mainstream of Impact Driving Method. A diesel hammer was developed by DELMAG of Germany in 1938 and imported to Japan in 1951. After that, it was domestically produced in 1954, and domestic machines have been developed one after another since 1960 [2)]. While the construction capacity of the diesel hammer was high, there was a problem that a loud noise was generated and oil smoke was contained when the exhaustion was made. Under such circumstances, public awareness of pollution, which had become a social problem since the 1960s, increased, and the development of construction methods that would suppress noise progressed even in pile driving work. This is how the "soundproof cover construction method" (Photo 4 (d)), which covered the diesel hammer with a soundproof cover, was developed. As a result, not only the noise generated during pile driving was reduced, but also the scattering of oil smoke was reduced. After that, hydraulic hammers (Photo 4 (e)), which were less noisy than diesel hammers and did not scatter oil smoke, began to be adopted, which has led to the current Impact Driving Method.

(a) Drop hammer[8]

(b) Steam hammer[8]



(c) Diesel hammer[9]

(d) Soundproof cover construction method[10]

(e) hydraulic hammer[11、12]

Photo 4 Transition of Impact Driving Method (Impact Hammers)

(2) Low Noise Piling Method (Vibro-hammer Method, Internal Drilling Method, Press-in Method)

Regulations on noise and vibration became stricter due to the enforcement of the law, making pile driving construction by the hammer in urban areas practically difficult. Compared to diesel hammers, although hydraulic hammers were less noisy and did not scatter oil smoke, more effective low noise and low vibration construction methods have been further required in urban areas.[13]. Therefore, as a construction method to reduce noise and vibration during construction, in cooperation with pile construction companies and tubular pile makers, the development of the Press-in Method has been promoted along with hydraulic construction machines (press-in machines), the embedded pile construction method (Internal Drilling Method, Pre-boring Pile Construction Method) and the vibration construction method by Vibro-hammer (Vibro-hammer Construction Method). [1]

1) Internal Drilling Method

In the case of the Internal Drilling Method, an auger screw is inserted into the hollow part of the steel pipe pile using a 3-point-support pile driving rig (Photo 5), and the soil at the toe of the pile is removed while excavating the ground and install the steel pipe pile to the specified depth. It is roughly divided into three methods according to the treatment method of the pile toe ((1) Cement Slurry Mixing Method, (2) Final Impact Driving method, and (3) Concrete Placing Method). One of them, the Cement Milk Spouting Stirring Method, is the mainstream of the Internal Drilling Method, that is after the pile reaches a predetermined depth, cement milk is spouted from the auger tip to produce enlarged base pile protection.

Photo 5 3-point support pile driver rig[15]

2) Vibro-hammer Method

Vibro-hammer was developed in 1934 under the guidance of Dr. Balkan of the Soviet Union, and is said to have been used for construction work after World War II[14]. Please refer to Fig.2 for the principle of penetration and extraction of the Vibro-hammer method. In general, when the soil is vibrated, the bonds between the soil particles that make up the soil temporarily decrease. Driving of the pile by the Vibro- hammer utilizes this phenomenon, that is, driving the pile utilizing the pile weight (Wp) and the weight of the Vibro-hammer (W) that exceeds the pile toe dynamic resistance (Rv) while loosening the shaft friction of the pile by vibration caused by the Vibro-hammer. There are two types of Vibro-hammers: the electric type (Photo 6 (a)) and the hydraulic type (Photo 6 (b)).

In 1960, 50 electric Vibro-hammers were imported at a stroke from the Soviet Union, which was then a developed country of Vibro-hammers, to drive steel sheet piles in the ground used as earth retaining walls. With this, the major flow of Vibro-hammer development began [1, 2]. The hydraulic types were domestically produced in 1970, and the electric types were domestically produced from 1967 to 1973. The Vibro-hammer has been improved since then; the hydraulic variable high frequency vibro-driving machine type was developed in 1988, and the electric variable high frequency vibro-driving machine type was developed in 1996. They are still widely used when building steel pipe sheet pile foundations. In the Vibro-hammer method, as a method to reduce noise and vibration during construction, there are cases where a jet pipe is installed on the pile, and jet water is ejected from multiple nozzles at the pile toe to drive the pile. (JV method).

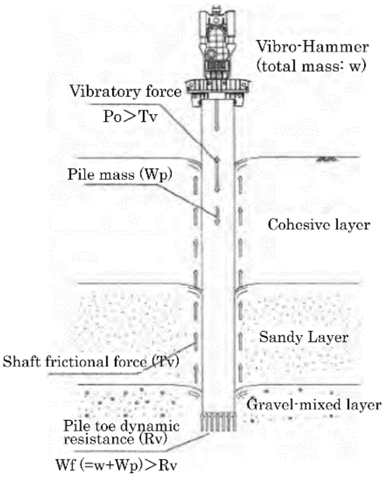


Fig. 2. Construction Principle Diagram of Vibro-Hammer[14]

(a) Electric[16]

(b) Hydraulic[17]

Photo 6 Vibro-hammers

3) Press-in Method

The Press-In Method is a low-vibration, low-noise method mainly used when constructing steel sheet pile walls and tubular sheet pile walls. In Japan, a press-in machine for steel sheet piles was put into practical use in 1975, which was about the same time as the vibration regulation law was enforced in 1976, and then around 1990, a press-in machine for steel pipe piles was put into practical use.

The press-in method requires a reaction force for press-in, and as a method to secure it, i) the method using the load of heavy objects (Weight method), ii) the pile/sheet pile extraction resistance during construction is used. (Extraction resistance method), iii) A method of press-in/extracting the next pile/sheet pile into the ground with a static load by hydraulic pressure using the extraction resistance of the pile/sheet pile that was previously installed. (Reaction piling method, Fig. 3), and so on.[18]. The Reaction piling method has the following features in addition to the features of low noise and low vibration.

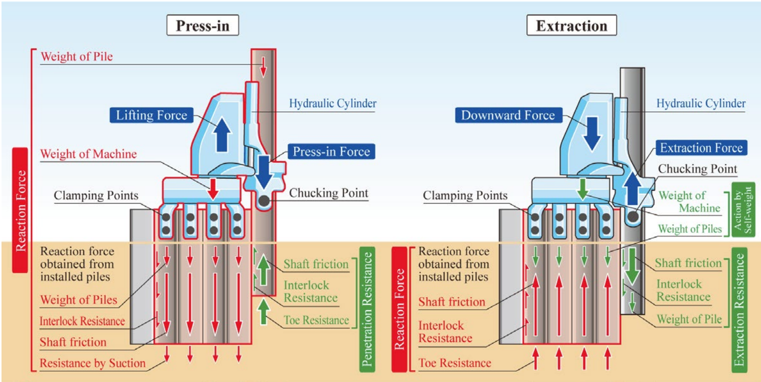


Fig. 3. Reaction force and resistance force acting during press-in/pulling-out using the reaction force piling method[18]

(1) Construction which does not require a vast construction yard is possible

As shown in Fig. 3, since construction utilizing a compact machine is possible, it does not require a vast construction yard and construction in a limited space is possible. Since the press-in machine walks on the previously installed pile/sheet piles by itself, it is possible to carry out the construction with only one crane for suspending the pile/sheet pile and pitching it in the construction machine. The "non-staging system" can be applied when there are various restrictions in places where temporary scaffolding cannot be constructed such as on slopes and water away from land. As shown in Fig.4, the non-staging system is a series of processes in which all the construction machines required for press-in are placed on the pile/sheet piles that were previously installed and move by themselves and carry out the process where the pile/sheet piles are transported, pitched, and installed. As a result, temporary-less construction can be realized, and construction can be performed even under severe construction conditions subject to various restrictions such as on slopes and water away from land.

(2) Application to various ground conditions is possible.

By using the driving assistance for the press-in method of the Reaction Piling Method, it becomes possible to construct under various ground conditions. For example, it is possible to press-in steel sheet piles and pipe sheet piles by using a water jet for densely compacted sandy ground and using an auger for harder ground such as gravel layers and layers containing a large number of cobbles. For underground obstacles such as ground with huge stones and reinforced concrete, there is the Rotary press-in piling method in which a special press-in machine presses into the ground and penetrates through obstacles by rotating a steel pipe pile with a bit at the toe.

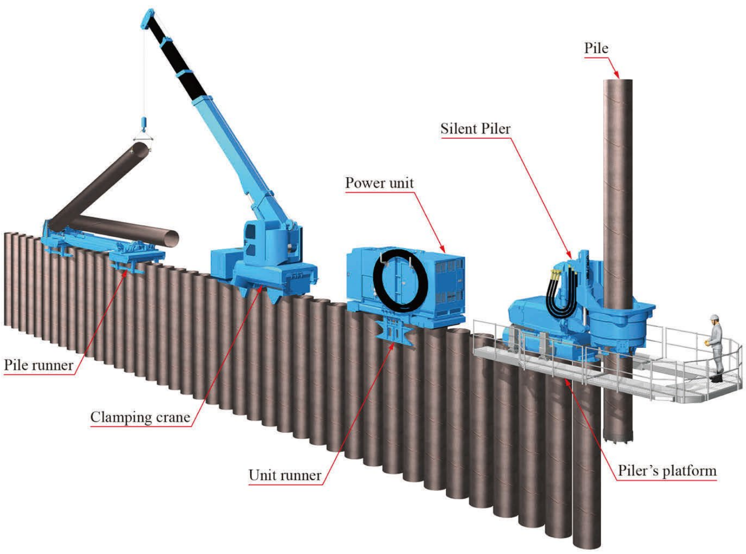


Fig. 4. Non-staging System [18]

(3) Development of high bearing capacity piling methods (Soil-Cement Composited Steel Piling Method, Screw Piling Method)

In Japan, as large-scale structures began to be planned and constructed in various fields, there has been an increasing need for a construction method that can secure bearing capacity and suppress soil discharge compared to the Internal Drilling Method. In response to such needs, high bearing capacity pile construction methods with excellent bearing capacity performance such as the Soil-Cement Composited Steel Piling Method and the Screw Piling Method have been developed.

1) Steel Pipe Soil Cement Pile Method

The Steel Pipe Soil Cement Pile Method (Photo 7) is a synthetic pile construction method in which, by applying ground improvement technology, cement milk of predetermined composition is injected into the original ground from the tip of the excavation stirring head, and then unify it by penetrating a steel pipe with outside protrusions (ribs) (Fig. 5) in the soil cement column created by mixing and stirring. It is possible to reduce the amount of soil discharged from the construction of soil-cement columns by utilizing the local ground[19,20], and there are also advantages such as being able to divert it to roadbed materials after solidification. In addition, since the protrusions (ribs) on the outer surface enhance the adhesion to the soil cement column for unification, the bearing capacity can be evaluated by the diameter of the soil cement column.

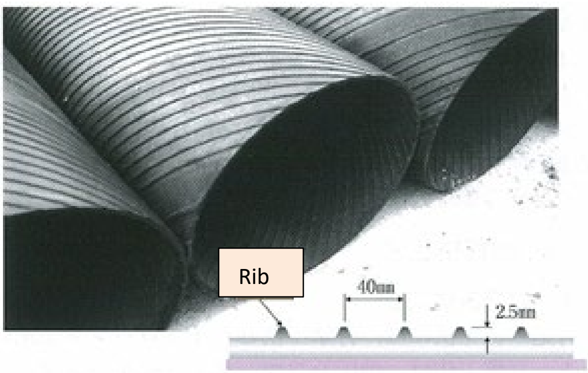


Fig. 5. Steel pipe with outside protrusions (ribs)[21]

Photo 7 Steel Pipe Soil Cement Piler[15]

2) Screw Piling Method

(a) Open-end type

(b) Flat type

Photo 8 Tip blades of the Screw Piling Method

The Screw Piling Method has been put into practical use since around 2000. The Screw Piling Method is a method that realized low noise and low vibration without generation of soil discharge, which was not solved by the Internal Drilling Method and the Steel Pipe Soil Cement Pile Method. Similar to the characteristics of the Impact Driving Method, it is possible to manage the construction through the pile body. As shown in Photo 8, the Screw Piling Method is a method in which a spiral blade or a steel pipe pile obtained by welding two steel plates to the toe of a steel pipe is rotated and penetrated into the ground by the propulsive force of the blade at the toe of the pile. There are two types, an open-end type, and a closed-end type. The construction method is classified into two types according to the pile diameter. If the steel pipe diameter is a small or medium diameter of about ϕ600 mm or less, construction is made using the rotary drive device installed in the Photo 5 3-point pile driving machine to apply a rotational force to the pile head, and if the steel pipe diameter is ϕ600 mm or more, construction is made using the body rotation method that applies rotational force to the steel pipe body with an all-around rotating machine. The Screw Piling Method is highly applicable to battered piles, and its adoption cases are increasing.

3) Construction Management

The main activities of the Japanese Technical Association for Steel Pipe Piles and Sheet Piles have been mainly organizing the standards in terms of materials, structures, and construction methods, but to become stricter on construction management and quality control in structural foundations in each field and respond to the transition to the reliability design method which will be described later, we are now tackling various issues related to construction technology and construction management, focusing on "construction" that affects the performance and quality of piles. For example, we have created and published the construction management guidelines (Figs. 6 (a) to (d)) for the Internal Drilling Method, the Screw Piling Method, the Steel Pipe Soil Cement Pile Method, and the Impact Driving Method which was introduced so far, and have made a great contribution to the realization of pile construction with high reliability. In addition, we have established a private-sector qualification named the "Steel Pipe Pile Construction Manager", and are contributing to the training of construction managers such as chief engineers or pile construction managers who have a wider range of advanced abilities in the steel pipe pile construction method.

(a) Internal Drilling Method (b) Steel Pipe Soil Cement Pile Method (c) Screw Piling Method (d) Impact Driving Method

Fig. 6. Guidelines of construction management of each method

3. Transition of design standards

As mentioned above, steel pipe piles, tubular sheet piles, and steel sheet piles began to expand their fields of activity during the period of high economic growth after the war. In addition to reflecting technological progress, users' requests, and efforts in the production by manufacturers, and design standards in each field have been reviewed due to the effects of disasters such as earthquakes. Here, I would like to introduce the main points regarding the transition of design standards.

(1) Transition to the Limit State Design Method and the Partial Factor Design

The Hyogo-ken Nanbu Earthquake that occurred at 5:46 am on January 17, 1995, which was later called the "Great Hanshin-Awaji Earthquake", caused enormous damage to the wide area of the Kinki region. It was one of the largest earthquakes at that time, and the damage to the city of Kobe near the epicenter, shocked not only Japan but all over the world as a disaster in the modern city which was the largest port in the Orient. The Hyogo-ken Nanbu Earthquake had a great impact on various fields such as roads, railways, ports, rivers, and buildings, and affected the subsequent design standards. In the field of roads and railways, the seismic design based on the Seismic ductility design procedure** has been developed in addition to the conventional design by the seismic intensity method based on the allowable stress. In the port and harbor field as well, major revisions were made based on the design system that allowed plastic deformation of steel pipe piles. As a response to the problems that arose while the results of designing by the conventional allowable stress method were accumulated, it was during this period when the development of the limit state design method, adopting the partial factor design method, considering uncertainties in the design as rational design method mainly in the field of superstructures was introduced and also the transition of the design standards for the foundations was made along with the superstructures after the 1990s[22)]. Please refer to Table 2 for when the transition of the design standards for foundations in each field to the limit state design method and partial factor design method was made.

** The Seismic ductility design procedure: A pseudo-static design method often used in Japan, in which the relation between the seismic capacity of foundation and its residual deformation is verified, by taking into consideration the absorbing capacity of dissipating energy due to plastic deformation of the foundation.

Table 2 When the transition of the design standards in each field to the limit state design method and partial factor design method were made[22)]

Design standards	Transition Year
Design standards for railway structures and explanations (Foundation structures)	1997
Recommendations for design of building foundations	2001
Technical standards and explanations for port facilities	2007
Road bridge specifications / explanation IV substructure edition	2017

(1) Introduction of performance design concept

As shown in Table 3, the concept of performance design was introduced in the fields of roads, railways, ports, and architecture in the 2000s [22)]. This seems to have been largely due to requests from society rather than the technical side, such as the promotion of performance standardization of international standards by the International Organization for Standardization (ISO)[23)]. Performance design is the idea of fulfilling the requirements of a structure and confirming the performance by a method with appropriate reliability. [22)]. The performance-based design method is being further promoted in each field based on the damage situation caused by the Kumamoto earthquakes that occurred in 2016.

Table 3 When the concept of performance design in each field was introduced[22)]

Design standards	Introduction Year
Guidelines for building foundational structure designs	2001
Road bridge specifications / explanation IV substructure edition	2001
Technical standards and explanations for port facilities	2007
Design standards for railway structures and explanations (foundation structures)	2012

4. Conclusion

This paper introduced the technological transition of steel pipe piles, tubular sheet piles, and steel sheet piles from the aspects of the product, construction, and design, although it was rather concise due to the page limitation. Since the period of high economic growth after World War II, Japan has developed a huge amount of infrastructure in the fields of roads, railways, ports, etc. Now that more than 50 years have passed since then, the aging of those existing structures has become apparent and it is necessary to take measures. We believe that the press-in method is one of the construction methods that is expected to play an active role as a reinforcing foundation pile for existing structures. This is because, as mentioned above, since construction can be made by a compact machine, it is possible to perform pile installation even under severe construction conditions such as proximity construction and overhead restrictions, which are difficult with a 3-point pile driver. At present, the press-in method is not adopted as a standard method in the Japanese Road Bridge Specification, but we expect that in the future it will become the standard construction method to be used as a reinforced foundation pile in addition to new structures by accumulating data on the required performance. You might find some parts insufficient in this paper, but we hope that this paper will be of some help so that steel pipe piles, tubular sheet piles, and steel sheet piles may make some contribution to the national land resilience in various fields in the future.

REFERENCE

1) Yamashita, H., Hirata,H. and Kinoshita, M. (2010): Challenges in the past and future of design and construction technologies on steel pipe piles in Japan, Journal of JSCE F, Vol.66, No.3, pp.319-336. (in Japanese).

2) Aoyanagi, H. (2008): Technical changes and current issues of construction machinery for foundation works, Kisoko (The Foundation Engineering & Equipment, Monthly), Vol.36, No.3, pp.5-11. (in Japanese).

3) Japan Association for Steel Pipe Piles (1984): Constructing Tomorrow, No.46, p.3. (in Japanese).

4) Research Committee on Corrosion Prevention and Repair Method: Technical information (https://www.bouhoken.com/info/) (in Japanese), accessed on March 3, 2021.

5) Ishiguro, T. (1984): Steel sheet pile method (book1), Sankai-do, 339 p. (in Japanese).

6) Nippon Steel Corporation: https://www.nipponsteel.com/product/construction/list-construction/06.html, (in Japanese), accessed on June 1, 2022.

7) Isohata, H. (2003): Historical study on iron pile foundation and screw piles, Journal of JSCE, No.744/Ⅳ-61, pp.139-150. (in Japanese).

8) GIKEN, LTD. : The museum of piling machines, https://www.giken.com/ja/mission/scientific_verification/the_museum_of_pile_drivers/, (in Japanese), accessed on March 3, 2021.

9) Japan Association for Steel Pipe Piles (1973): Constructing Tomorrow, No.7, p.5. (in Japanese).

10) Japan Association for Steel Pipe Piles (1975): Constructing Tomorrow, No.16, p.7. (in Japanese).

11) Nippon Sharyo (2002): Catalog, Hydraulic hammer NH-B series. (in Japanese).

12) TC-Japan: Hydraulic hammer, http://tc-japan.co.jp/data_04 (in Japanese), accessed on March 3, 2021.

13) Japan Technical Association for Steel Pipe Piles and Steel Sheet Piles (2009): Steel Pipe Piles – Design and Construction -, 603 p. (in Japanese).

14) Technical Research Association for Vibro-hammer Method (2015): Handbook of design and construction of vibro-hammer method, 158 p. (in Japanese).

15) Examination Committee of Construction Manager of Steel Pipe Piles: Reference document, http://www.sppshiken.com/ ？ page_id＝12. (in Japanese), accessed on March 3, 2021.

16) Chowa Kogyo Co. LTD. (2008): Catalog, Electric type Vibro-hammer, Zero VR, Zero MR series.

17) Chowa Kogyo Co. LTD. (2016): Catalog, Hydraulic type Vibro-hammer, Zero SR-series.

18) International Press-in Association (2021): Design and Construction Guidelines of the Press-in Method, 2nd print, 241 p. (in Japanese).

19) Japan Institute of Country-ology and Engineering (2012): Report on Technical Evaluation for HYSC piles (Steel Pipe Soil Cement Piling Method) (in Japanese), 154 p.

20) Japan Institute of Country-ology and Engineering (2006): Report on Technical evaluation for Gantetsu piles (Steel Pipe Soil Cement Piling Method) (in Japanese), 179 p.

21) Okahara M. (2013): Recent trend of manufacture and construction technology of steel pipe piles, Kisoko (The Foundation Engineering & Equipment, Monthly), Vol.41, No.2. p.6. (in Japanese)

22) Japanese Geotechnical Society (2013): Introduction to bearing capacity of deformation of foundation, Introductory series 39, 271 p. (in Japanese).

23) Sugiyama, H. (2004): Fundamental knowledge and application of bridge design based on performance-based design, civil-eye.com web seminar. (in Japanese).

◆ A brief CV of Mr. Tomoyuki Suzuki

After graduating from Saitama University in 2003, Mr. Suzuki joined Kubota Corporation, where he has been engaged in demand development for steel pipe piles and technical review work related to design and construction. Since September 2014, he has been participating in the activities of the Japanese Association for Steel Pipe Piles (JASPP), mainly in the Road and Railway Technical Committee. Currently, in addition to being the head of the Steel Pipe Sheet Pile Team of the Technical Committee for Roads and Railways, he is also the head of the Public Relations Working Group, which provides information on the technical activities of the JASPP regarding steel pipe piles, steel tubular sheet piles, and steel sheet piles.

Report

From IPA Singapore Regional Office

Hiroki Kitamura

Giken Seisakusho Asia Pte., Ltd.

Introduction

The Asian IPA regional office is Giken Seisakusho Asia Pte., Ltd., which is a subsidiary of GIKEN LTD. It has been promoting the Press-in Method in Asia, with the exception of China. In 2021, a representative office in Thailand was established to promote the Press-in Method proactively in countries such as Thailand, Cambodia, and Vietnam, in and around the Mekong River basin. This report discusses the current climate of the Press-in Method in Asia, collaboration with the IPA, a recent case study in Singapore and future prospects of the Press-in Method in Asia.

The Press-in Method in Asia

The utilization of the Press-in Method is increasing in Asia, particularly in major cities such as Singapore and Bangkok, owing to the Press-in machine's low noise, low vibration and compact size. Until now in Singapore, the U-shaped steel sheet pile type 4 has been commonly used for temporary structures; however, the number of projects utilizing Hat-type sheet piles (900mm wide) for temporary structures has been increasing since 2018. This can be attributed to Singapore's implementation of Eurocodes, as its building codes in 2013. With Eurocodes, U-shaped sheet piles require that "Reduction Factors" be considered (as the interlocking position is located on the center line of the wall), reducing the U-shaped sheet pile properties. In contrast, Hat-type sheet piles do not require the consideration of "Reduction Factors" as the interlocking position is not located on the center line of the sheet pile wall. Therefore, with Hat-type sheet piles, it is possible to reduce the total weight of a sheet pile wall, as well as to reduce the number of struts, which is a significant advantage. Hence, Hat-type sheet piles are being increasingly utilized/adopted in Singapore. Currently, we are also targeting Thailand to promote the Press-in Method with Hat-type sheet piles. The Press-in Method has been specified-on the Pasak River project, which has been ongoing since May 2022, and we are working on specifying it on other large river projects.

Collaboration with IPA Directors

In association with the IPA President, Professor Chun Fai Leung and Auditor Dr. Goh Teik Lim, we are in the process of planning the third International Conference on Press-in Engineering (ICPE 2024). It will be held in Singapore in 2024, and this will be the first ICPE to be held outside of Japan. In Thailand, regular meetings are held with Director Dr. Pastsakorn Kitiyodom to discuss project information and exchange opinions about the potentials of the Press-in Method (Fig. 1). He also cooperated in the writing of "Press-in Retaining Structures: A Handbook Second Edition, 2021 (Thai Version)" (Fig. 2). In Malaysia, Vice President Dr. Nor Azizi Bin Yusoff has held several Press-in Method webinars during the pandemic. In addition, his team is trying to specify the Press-in Method on a retaining structure project. Unfortunately, owing to the pandemic, there were few opportunities to work with him on promotional activities. Despite that, promotional activities in Malaysia will resume shortly.

Fig. 1. Meeting with Dr. Kitiyodom (Thailand)

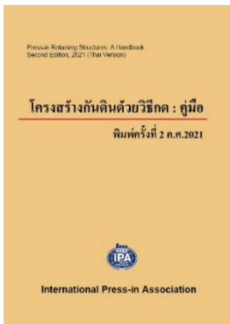


Fig. 2. Handbook (Thai version)

Recent Case Study in Singapore (Deep Tunnel Sewerage System Phase 2 T10 TS/SS site, Singapore)

In Singapore's Deep Tunnel Sewerage System (DTSS) Phase 2 T10 TS/SS site, the Press-in Method with auguring was used for the first time in Singapore, to the installation of Hat-type sheet piles. The DTSS is a system used for water collection and transportation through a deep sewerage tunnel that transports domestically used water to water reclamation plants. It is then purified into ultra-clean water (NEWater). Hat-type sheet piles were installed to form a series of cofferdams which are used as TBM tunnel shafts.

The TS site is located in the vicinity of schools, roads, MRT railway, and residential areas. Therefore, minimizing vibration and noise was essential, making the Press-in Method well suited for the task. Moreover, there was no risk of the press-in machine overturning as it securely grips the previously installed sheet piles. Furthermore, the compact size of the press-in machine allowed it to function in an extremely narrow working space. Finally, as the maximum SPT N value was over 400, press-in with auguring was adopted as the best method.

As shown in Fig. 3, the excavation depth was over 20m. The U-shaped sheet pile type 4 did not meet the required bending stiffness; therefore, a soldier pile wall was considered. A soldier pile wall is a combined wall, using U-shaped sheet piles and H piles. To meet the required bending stiffness of the retaining wall, it would have been necessary to use large H piles in the soldier pile wall. For this reason, Hat-type sheet piles 50H (sheet pile length of 26.0m) were utilized instead of U shaped-sheet piles and soldier piles. Fig. 4 shows the overview of the construction site and Fig. 5 is the photo of the construction in progress.

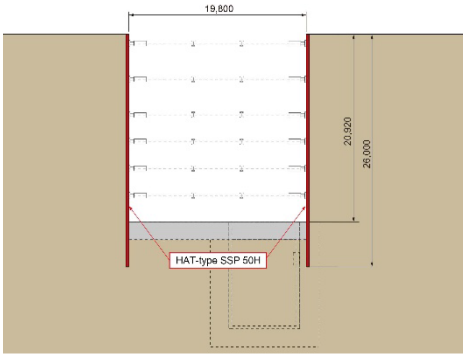


Fig. 3. Cross section (TS site)

Fig. 4. Overview of the construction site (TS site)

Fig. 5. Piling in progress (TS site)

Future Prospects for the Press-in Method in Asia

One of the IPA research activities is the TC5, which is to research the influence of the operator's skill and experience on the performance of press-in piling. The paper, which was successfully published, concluded that the operator's experience and skill play an important role in effective press-in piling with minimum risk of machine damage. In Singapore, the Giken Total Support System (GTOSS) ASIA was launched in October 2021. One of the purposes of GTOSS ASIA is to improve the press-in machine operator's skill. Therefore, we dispatched a skilled instructor to sheet piling companies in Singapore as skillful operators are one of the key factors in promoting the Press-in Method. GTOSS ASIA will be launched not only in Singapore but also in Thailand and Taiwan in thse near future, as there are several projects utilizing the Press-in Method. As we move forward, we continue to provide the best possible proposals to our stake holders regarding the adoption of the Gyropress Method (Rotary Cutting Press-in Piling Method for steel tubular piles). Finally, the pandemic completely changed the world; however, our goal remains the same. We will continue to cooperate with IPA offices in Japan and other countries to promote the Press-in Method in both Asia and around the world.

Report

IPA President's visit to Tokyo Headquarters

Chun Fai Leung

President, IPA

I became the President of IPA in June 2020 succeeding Prof Osamu Kusakabe who had completed his two terms of office. I started serving my second term as IPA President in July 2022. Owing to the pandemic, the IPA Board of Director Meetings had been held online for the past two years. With the recent relaxation of entry to Japan, I visited the IPA Tokyo Headquarter in mid-July 2022 and this was the first time I visited the Headquarter since becoming IPA President. I chaired the Board of Directors Meeting on 11 July 2022 in hybrid mode with the presence of many directors physically from Japan as well as many directors taking part online from outside Japan (Photo 1). Besides the usual matters to be dealt with by the Board, I briefed the Board on the progress of the International Conference on Press-in Engineering (ICPE) to be held in Singapore in July 2024. It is also planned that the next Board of Directors Meeting to be physically held in Singapore in November 2022 in conjunction with an IPA seminar to be held back-to-back.

Photo 1. IPA Board meeting in Tokyo

On 12 July 2022, I took the opportunity to hold an informal meeting with the IPA Secretariat support staff. One of the key topics discussed at the meeting is on the detailed planning and execution of ICPE2024.

On 13 July 2022, I paid a courtesy call to Mr. Moribe, President of GIKN LTD., in Tokyo. We exchanged ideas on the promotion of press-in piling particularly on the use of the Press-in technique on tackling climate change issues such as carbon neutral, environmental and coastal protection that have been constructed, under construction, or under planning in many countries worldwide.

On 14 July, I together with the key personnel of the IPA Secretariat paid a courtesy call to IPA Honorary President Mr. Kitamura in Kochi. Before the meeting, the team has the opportunity to visit the new Museum of Piling Machines and exhibitions which will be officially open to visitors by GIKEN in the near future (Photo 2). During the meeting, fruitful interaction and exchange of ideas on the evolution of the Press-in technique was fondly discussed.

Photo 2. Group photo in the Museum of Piling Machines

Report

Attending and Speaking at ICONHIC 2022 (3rd International Conference on Natural Hazards and Infrastructure)

Takefumi Takuma

Senior Advisor, Giken America Corp.

In early May this year, the subject international conference was held in Athens, Greece, to provide a forum for the enhancement of infrastructures' resiliency in the face of ever-increasing natural disasters, which often destroy infrastructures. The conference organizer was the Athens-based Innovation Center on Natural Hazards and Infrastructure. The National Technical University of Athens and ETH Zurich (Swiss Federal Institute of Technology in Zurich) provided supervision over organizing the conference with the support from the ASCE (American Society of Civil Engineers), the Hellenic Association of Insurance Companies, the Resilient Cities Network, and the Hellenic Society for Soil Mechanics and Geotechnical Engineering. The size of attendance was approximately 300; primarily from Greece, the rest of Europe, and the United States with a few from other parts of the world. It was going to be held last year, but was postponed for a year in order to deal with the Covid-19 situation.

Overall, it was well prepared and very smoothly run with the employees of the organizer and a group of volunteers (primarily local students). A large number of invited speakers and theme lecturers were apparently internationally recognized experts in their respective fields (most of whom spoke in person) while some of them participated remotely due to travel restrictions and last-minute flight cancellations. Representatives from the banking and insurance industries were also present in addition to engineers to share their standpoints with a notion that large-scale infrastructure projects of the PPP (Public-Private Partnership) type which they would finance and/or insure could be severely impacted during their service lives if lacking a certain level of resiliency. Here, the author believes that the press-in piling method could become a key to achieving a high level of resiliency in some major infrastructures; likely resulting in easier financing and with lower insurance premiums.

The discussions made at this conference appeared to symbolize the elevated sense of urgency for a higher level of infrastructures' resiliency to be achieved in Europe and the U.S. While attendees from Asia were limited, multiple speakers emphasized that the experience in infrastructure resiliency enhancement in Japan and some other regions of Asia should be learned and promulgated for the rest of the world. It was also noted that further participation by the government sector would be essential for a future forum like this one since their presence appeared minimal at this conference.

Representing Giken Ltd., the author presented a paper titled "Landslide Mitigation for Bridge Piers on an Unstable Slope with Rows of Pressed-in Pipe Piles" on a project in Japan in front of an audience of approximately 30. Kubota Corp. of Japan held a booth as one of eight exhibitors on their earthquake-resistant ductile Iron pipes. The organizer discussed the next conference to be held in two years at a different venue. More information on the conference can be found at the following link.

https://iconhic.com/2021/

The author appreciates the assistance provided by the International Press-in Association for author's attendance and Ian Vaz of Giken America Corp. for editing this article.

Fig. 1. Megaron Athens Concert Hall (Center)
and International Conference Center (Semi-underground structure to the left of the Concert Hall)

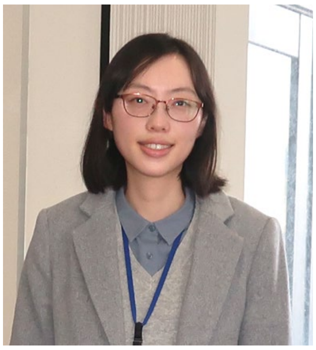
Fig. 2. Panel Discussion at the Conference

IPA News Letter Volume 7, Issue 3 September 2022

Young Members Column

Xi Xiong

Assistant Professor, Faculty of Geoscience and Civil Engineering
Kanazawa University



I am Xi Xiong from China. After graduating from Tongji University in Shanghai, I became a master's student at the same university. When I was in my first year of the Master's course, I came across an opportunity for a double degree program between Tongji University and Nagoya Institute of Technology. This became the moment for me to study in Japan. After graduation, I chose to continue my doctoral studies at Nagoya Institute of Technology.

During my study at Nagoya Institute of Technology, my research was focused on modelling the mechanical properties of unsaturated soil and its application to geotechnical problems. Generally, most geomaterials in surface ground are at the unsaturated state. This means that the grounds closely related to human activities are basically unsaturated grounds. The mechanical and hydraulic properties of unsaturated soil are considered to be much more complicated than those of saturated soil. However, after conducting many element tests on unsaturated soil, I realized that though the mechanical properties of unsaturated soil are complicated, they can still be described by a unified constitutive model. Using the unsaturated soil constitutive model, I found geotechnical problems, such as slope stability subjected to rainfall and seepage stability of a landslide dam, could be properly solved. Therefore, I believe unsaturated soil mechanics can be applied to a wider range of geotechnical problems.

Now I am working at Kanazawa University, Japan. Modelling of unsaturated soil is still an important research direction of mine. In addition to this, I have started to study the bearing capacity of pile foundations. Sheet piles are commonly used for retaining walls, land reclamation, and underground structures such as car parks and basements to provide temporary or permanent earth support. In recent years, efficient installation methods of piles have been developed, such as Silent Piler and Gyro Piler etc. Using these technologies, sheet piles can be installed with high accuracy and high-quality. To show the possibility to use sheet piles for permanent piled raft foundations, a series of model tests were conducted by my research group. And we found that a piled raft foundation supported by sheet piles would be a promising alternative to a conventional pipe pile foundation, especially in highly-seismic areas. The Second International Conference on Press-in Engineering 2021 held by IPA gave me a very valuable opportunity to present this work.

I began to think about the relevance of my different research directions. For a friction pile, shaft and base resistance together constitute its bearing capacity. The performance of a friction pile is a problem of structure-soil interaction. For the rational design of pile foundationss, not only the properties of the piles but also the mechanical behavior of soil is important. At present, pile foundations are normally designed to extend principles of saturated soil mechanics assuming fully drained conditions. As I mentioned above, the grounds closely related to human activities are basically unsaturated grounds and part or all of the pile foundations are in the unsaturated ground. In some regions, the fluctuation of groundwater table in a year is very significant, which means the changes in the mechanical behavior of soil are also significant. The performance of piles installed in the unsaturated ground could be also influenced by the fluctuation of the groundwater table. Therefore, using saturated soil mechanics to design a pile foundation could overestimate or underestimate its bearing capacity. To investigate how the properties of unsaturated soils influence the performance of pile foundations, I recently started a new research project. I hope my work can promote the application of unsaturated soil mechanics in geotechnical engineering, and provide a reference for the design of pile foundations in the future.

Announcement

New president of Japanese Geotechnical Society (JGS), Professor Junichi Koseki

Yukihiro Ishihara

Manager, Scientific Research Section
GIKEN LTD.

Prof. Junichi Koseki has been designated as the 37th president of the Japanese Geotechnical Society (JGS) since June 14th in 2022. He is a professor at the Department of Civil Engineering, the University of Tokyo (UTokyo). He was the Director of IPA for two years until June 2022. He participated in the activity of IPA-TC2 as a member, and contributed to the publication of the technical material on the use of the press-in piling data for estimating subsurface information.

He obtained his Bachelor, Master and Doctoral degrees from UTokyo. During the period of 1987-1994, he worked as a researcher at Public Works Research Institute, Ministry of Construction, Japan. In 1994, he moved to UTokyo as an Associate Professor at Institute of Industrial Science. After promotion to a professor in 2003, he moved to the current position in 2014. His research fields include liquefaction and its countermeasures, deformation and strength properties of geomaterials, and seismic behavior of earth structures. He received the C.A. Hogentogler Award from Committee D-18 on Soil and Rock, ASTM in 2000 and 2004, and the Best Paper Awards from the Japanese Geotechnical Society in 2007, 2009, 2010, 2012, 2016, 2021 and 2022. He was also the 2010-2011 Mercer Lecturer endorsed jointly by the International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE) and the International Geosynthetics Society, and the fifth Bishop Lecturer endorsed in 2019 by TC101 of ISSMGE on laboratory stress strain strength testing of geomaterials.

He has pointed out that, from the viewpoint of the contribution of JGS to society, it is important to work on the following issues:

1. Continuing the dissemination of the information related to geotechnical disasters for the general citizen, to respond to the social concern especially when the disaster occurs.
2. Promoting the understanding of the general citizen and construction personnel on how to cope with the multifarious ground conditions. Making an international contribution by disseminating information on this issue outside of Japan as well.
3. Promoting the digitization of the existing publications from society.

New Members

Members who joined IPA from June to August 2022.

- New Individual Members

Soichiro Okamoto	Atsushi Okamoto	Junichi Makimura	Tatsuma Kitamura	Riho Okitsuka
Nobuaki Suzuki	Kyo Nakahira	Sayuki Shingai	Takeshi Kondo	Souta Naruse
Yuka Yamaoka	Ayumu Hashigaya	Taiki Sugimoto	Masato Sawada	Taichi Tazawa
Kohei Akashi	Kanako Hisamatsu	Rito Kitamura	Sora Shingaki	Koutarou Kawamura
Shoya Tanaka	Ayase Nakajyo	Kosei Fukuoka	Tadamichi Saiki	Yukito Okazaki
Nagomi Sakamoto	Hana Kadowaki	Kizuki Ogasawara	Mizuki Funaoka	Suzuka Tokunaga

Emi Yaguchi Saori Hamauzu Naoya Matsumoto Shinji Taenaka Houma Takeda
Majid Ghayoomi

- New Student Members

Xi Chen Xiaojing Jia Jiaqi Zhang Ke Chen Shinya Miyatani

- The number of Members (as of 31 August 2022)
  Individual Members: 719 Student Members: 57 Corporate Members: 52

IPA 15th Anniversary Seminar in Singapore
- Global Best Practices of Press-in Piling Method -

IPA will hold the 15th anniversary seminar in Singapore on 18 November 2022. IPA was founded in February 2007and a special issue of the IPA Newsletter was published in February this year to commemorate the occasion.

As the situation of the pandemic has tuned better and many countries have deregulated in COVID-19. So it allows us to hold the seminar in Singapore which covers the past, present, and future of IPA. The recent Press-in piling applications from Asia, Europe, North America, South America and Africa will be introduced too in this seminar.

Details of the seminar are as follows.

Date:	18th November 2022, Friday AM	
Venue:	Novotel Singapore on Stevens	
Address:	Orchard District, 26 - 28 Stevens Road, Singapore 257878 (https://www.novotel-singapore-stevens.com/)	
Registration fee:	*Buffet lunch and coffee breaks will be provided	
	Non-Members	JPY9,000 (approximately S$90) per person
	IPA Members	JPY8,000 (approximately S$80) per person
	Students	JPY 5,000 (approximately S$50) per person

The program and registration will open at the end of September. Please visit our website for the latest information. https://www.press-in.org/en/event

Event Dairy

Title	Date	Venue
■ **IPA Events** https://www.press-in.org/en/event		
The Third International Conference on Press-in Engineering (ICPE 2024)	July 2024	Singapore
International Society for Soil Mechanics and Geotechnical Engineering http://www.issmge.org/events		
10th International Conference on Physical Modelling in Geotechnics 2022	September 19-23, 2022	Daejeon, South Korea
Conference on Stress Wave Theory and Design and Testing Methods for Deep Foundations	September 20-23, 2022	Rotterdam, Netherlands
3rd Symposium for Young Tunnellers of Asia (SYTA2022), October 27-28, 2022	October 27-28, 2022	Changsha, China
16th International Conference on Geotechnical Engineering	December 7-8, 2022	Lahore, Pakistan
■ **Deep Foundations Institute** http://www.dfi.org/dfievents.asp		
DFI-India 2022: 11th Annual Conference on Deep Foundation Technologies for Infrastructure Development in India	September 15-17, 2022	Tirupati, India
47th Annual Conference on Deep Foundations	October 4–7, 2022	Maryland, United States
DFI & Piling and Foundation Specialist Federation	November 16-18, 2022	Sydney, Australia
6th International Conference on Grouting & Deep Mixing	January 15-18, 2023	New Orleans, United States
■ **Others**		
BAUMA 2022	October 24-30, 2022	Munich, Germany
13th International Symposium on Environmental Geotechnology, Energy and Global Sustainable Development	December 7-9, 2022	Nanjing, China
18th International Symposium for Geotechnical Safety & Risk	December 14-16, 2022	Newcastle, Australia

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Japan

株式会社 カナモト
Kanamoto Co., Ltd.
Japan

Editorial Remarks from persons in charge

Dr. Ramin Motamed
(Associate Professor, University of Nevada Reno)

Post-disaster reconnaissance of areas affected by earthquakes has documented extensive damage to shallow-founded structures within liquefaction-prone areas. For example, the 2010-2011 New Zealand earthquakes caused severe liquefaction throughout parts of Christchurch and damaged more than 20,000 residential homes. The 2011 Tohoku earthquake caused similar levels of liquefaction-induced damage, with about 27,000 houses damaged. Liquefaction-induced building damage was also observed after the 1999 Kocaeli, 1989 Loma Prieta, and 1906 San Francisco earthquakes. These earthquakes highlight the need to understand the mechanisms that govern liquefaction-induced building settlement and proper mitigation measures.

The literature contains abundant information on several methods to mitigate liquefaction-induced ground movement effects on foundations such as the installation of sheet piles, among others. The efficacy of different mitigation methods should be studied in detail considering several factors such as budget, time, the importance of the project, nearby residential areas, the performance of nearby structures, space for remedial work, extent of liquefaction potential, and other issues.

The fundamental knowledge gained as a result of these types of studies can be used to achieve continued functionality performance objectives in buildings and societal-level resilience.

Mr. Tsunenobu Nozaki
(General Manager, GIKEN LTD.)

When we turn on a TV or start up a computer, we increasingly see news on natural disasters these days. I feel it is almost *Déjà vu* as there are a number of major natural disasters hitting somewhere on the planet daily. Also, we see the impact of the disasters is getting worse, with some bringing record high-level damage. It seems there are no longer any exceptions on the planet. The question is now becoming “when”, not “where” disasters will occur. In the worst-case scenarios, disasters are life-threatening and the consequences are life-changing. They may not be the most devastating, however natural disasters may nowadays shake the global economy, so it is difficult for anyone to avoid the effect of disasters.

Even in these modern times, it is extremely hard for us to control our destiny when the planet goes wild. Being the catalyst of some natural disasters, I would like to think that at least global warming is not irreversible. More and more emphasis will be placed on the construction industry to become more effective in relation to both disaster prevention and decarbonization. In my view, being carbon neutral would be the minimum goal for us to avoid global warming. Therefore, the construction industry should be more focused on carbon capture and storage and embrace this new attitude in these modern times. It is an imminent issue and we should act more urgently with a sense of crisis.