News Letters

Volume 7, Issue 1 February 2022

15th 2007-2022

Anniversary Special Issue

Development and Future Prospects of Press-in Piling

International Press-in Association

国際圧入学会

IPA NewsLetter Volume 7, Issue 1 February 2022

Contents

Chapter 1

The 15th Anniversary

IPA NewsLetter Volume 7, Issue 1 February 2022

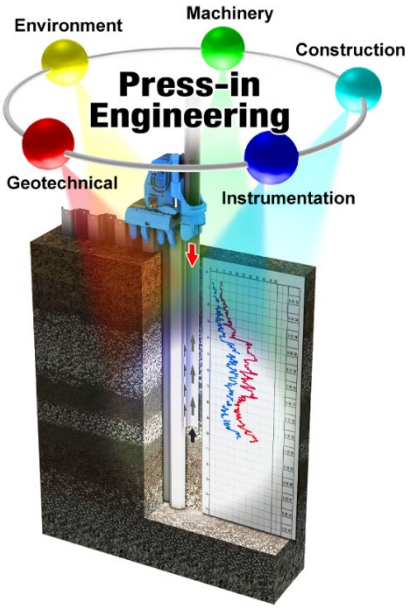
Introduction of IPA

The IPA is the academic organization to explicate the unseen phenomena and mechanism of underground by the Press-in Engineering in close coordination with various technical fields such as geotechnical, environmental, mechanical, construction and instrumentation engineering.

Name of Association	International Press-in Association (IPA)
Date of Establishment	16 February, 2007
Board Members	30

Aim

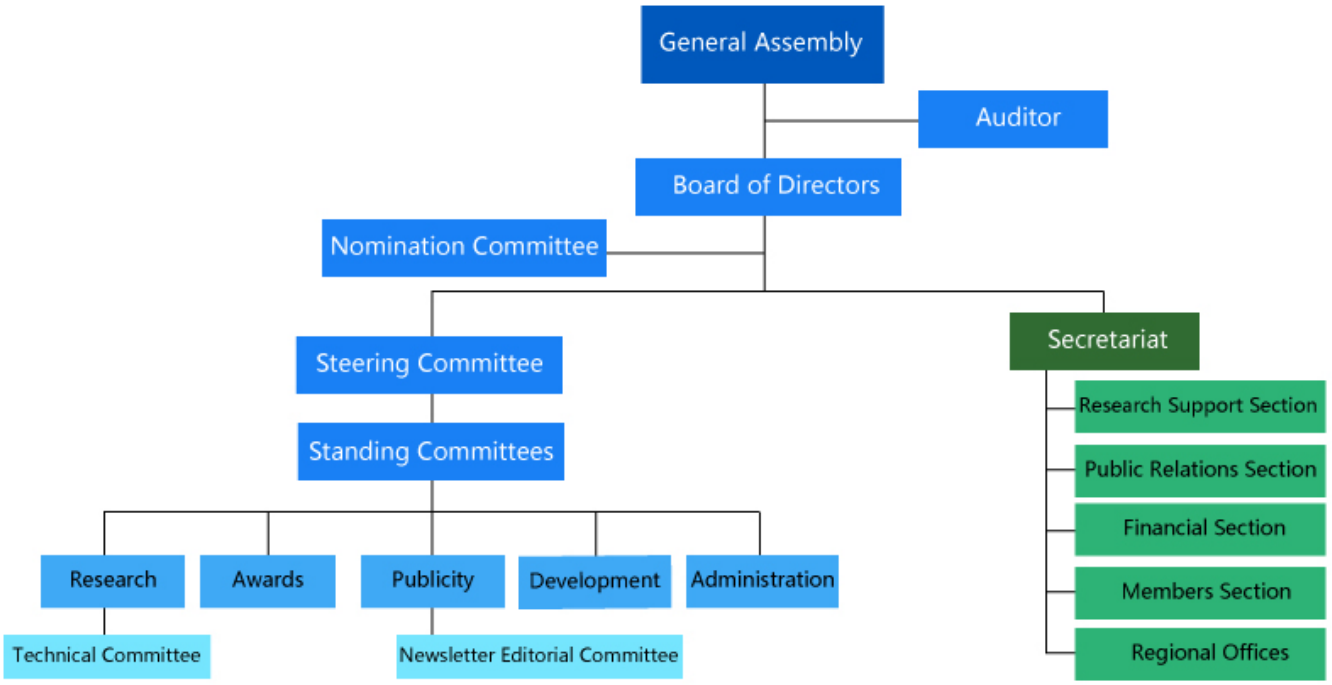
- Establishing a worldwide network sharing an academic interest in the Press-in Method
- Social contributions following academic development regarding the Press-in Method
- Social contributions following human resource developments regarding the Press-in Method



Activities

- Collection and distribution of technical information
- Providing opportunities to publish research and case studies
- Research to solve specific technical issues

Organization



Timeline

1975 - 2005

- 1975 The first SILENT PILER was developed by Mr. Akio Kitamura of GIKEN LTD. in Japan.
- 1994 The research collaboration started between GIKEN and the Cambridge University.
- 2002 Prof. D. White (University of Southampton) earned a PhD degree related to the Press-in Method.
- 2005 The IPA Preparatory Assembly was held at Kochi University of Technology in Japan by Mr. Akio Kitamura (GIKEN LTD.), Prof. Malcolm Bolton (University of Cambridge), and Prof. Hajime Okamura (Kochi University of Technology).

Research collaboration


Founding members

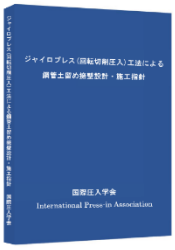
2007 - 2011

- 2007
  - International Press-in Association (IPA) was established.
  - Prof. Malcolm Bolton assumed the first IPA President.
  - The first "IPA International Workshop" was held in the Cambridge University.
- 2008 The second "IPA International Workshop" was held in New Orleans, The United States.
- 2009 The first collection of research papers in Press-in Engineering "Press-in Engineering 2009" was published.
- 2010
  - The first IPA Press-in Engineering Seminar was held in Tokyo, Japan. (hereafter continuously annualy held in Japan)
  - The third "IPA International Workshop" was held in Shanghai, China.

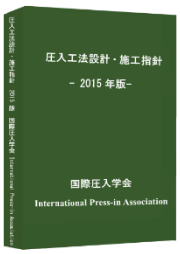

IPA Press-in Engineering Seminar

2012 - 2016

- 2012 The fourth "IPA International Workshop" was held in Singapore.
- 2014
  - "Design and construction manual of steel tubular pile earth retaining walls by Gyropress Method (2014)" in Japanese was published.
  - The fifth "IPA International Workshop" was held in Ho Chi Minh City, Viet Nam.
- 2015 “Design and construction manual of the Press-in Method (2015)” (in Japanese) was published.
- 2016
  - Dr. Osamu Kusakabe assumed the second IPA President.
  - IPA Newsletters started being published.
  - Press-in retaining structures: a handbook (First edition 2016) was published.
  - The Technical Committee (TC2) "Estimation of Subsurface Information from Data Obtained during Press-in Piling" was founded.

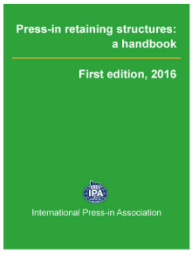


"Design and construction manual of steel tubular pile earth retaining walls by Gyropress Method (2014)"



“Design and construction manual of the Press-in Method (2015)”

First Issue of Newsletter



Press-in retaining structures: a handbook (First edition 2016)

2017 - 2021

- 2017
  - The first IPA Seminar on Press-in Technology was held in Singapore. (hereafter continuously held in Asian Countries)
  - The TC1 "Application of cantilever type steel tubular pile wall embedded to stiff ground" was founded.
  - The TC3 "Expansion of Applicability and Assessment of Seismic Performance of PFS Method" was founded.
  - IPA Website (English and Japanese) was renovated.

IPA Seminar on Press-in Technology

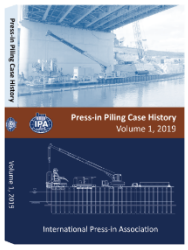
Website


Technical Committee

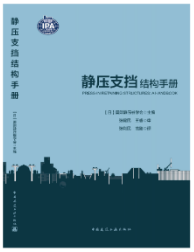
- 2018
  - IPA Award related to Press-in Technology was founded.
  - The first International Conference on Press-in Engineering (ICPE2018) was held in Kochi, Japan.
  - IPA Secretariat was reformed and IPA Regional Offices were founded.


ICPE2018

- 2019
  - “Press-in Piling Case History Volume 1, 2019” was published.
  - IPA Library was founded.
  - The TC4 "Vertical performance and construction management of sheet piles installed. by the Press-in Method and tubular piles installed by Rotary Cutting Press-in Method" (TC4) was founded.
  - Chinese Version of “Press-in retaining structures: a handbook” was published.
- 2020
  - “Design and construction manual of the Press-in Method (2020)” (in Japanese) was published.
  - The TC5 "Influence of operator skill and experience on field performance of Press-in Piling" was founded.
  - Prof. Chun Fai Leung assumed the third IPA President.
  - IPA Website in Chinese was launched.
  - "New Horizons in Piling" was published from CRC Press.
- 2021
  - The TC5 "Investigation and analysis of the development status of Press-in technology in China” was founded.
  - The second International Conference on Press-in Engineering (ICPE2021) was held online.
  - Press-in retaining structures: a handbook (Second edition, 2021) was published.
  - Press-in retaining structures: a handbook in Russian, Thai and Portuguese version were published.

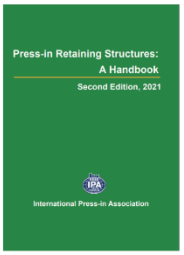


Press-in Piling Case History Volume 1, 2019



Chinese Version of “Press-in retaining structures: a handbook”

Design and construction manual of the Press-in Method (2020)



Press-in retaining structures: a handbook (Second edition, 2021)

Message from Honorary President

Akio Kitamura

Honorary President

Executive Chairman, GIKEN LTD.

As one of the founders of the International Press-in Association (IPA), I am very happy and proud to see that the IPA is celebrating its 15th anniversary since its establishment in 2007, and its philosophy and activities are spreading all over the world. Forty-six years have passed since the invention of "SILENT PILER®", the first practical application of the "Press-in Principle", and in the meantime, "Press-in" has spread all over the world and a new "Press-in Industry" has been born and developed.

What happens underground had been left unascertained by even the professionals of underground construction on the fact that “Underground is invisible, so we don’t know what happens underground.” The IPA was founded with the aim of "making the invisible underground visible", and it is a great pleasure that the aim has been realized and the "superiority of the press-in principle" has been proved by engineers and researchers around the world, and there is no doubt that there is a great potential and future for the press-in method. However, a number of people, trapped by precedentism, still use unscientific design and engineering methods.

In the Great East Japan Earthquake in 2011, about 20,000 people died when a huge levee, its existence had been absolutely trusted, collapsed easily and allowed the tsunami to invade. Although the vulnerability of the footing structure was exposed by the disaster, the same structure that is further enlarged and simply covered with concrete was adopted in many places for reconstruction.

Recently, we have been hit by heavy rains every year and there have been many cases of earthen levees collapse, sinking the invaluable resources such as human lives, culture, history, and many kinds of property into the muddy waters all over the country. Despite the fact that these are disaster prevention structures that should protect lives and property, the government's outdated policy of "Levees shall be constructed by piling up soil” as stipulated by government ordinance, remains unchanged. Instead, we should incorporate the latest science and technology into the area of national disaster prevention which is the most important issue and build tenacious structures that never collapse.

Furthermore, the shortage of manpower in the civil engineering and construction industries is a serious problem. We need to change to automated and unmanned construction methods instead of the old methods that require people on site. In addition, the reduction of carbon dioxide emissions to curb global warming has become an important issue worldwide that needs to be addressed.

Press-in method has the advantage to solve these urgent issues fundamentally. The "Implant Structures" constructed by the press-in method are able to withstand earthquakes, tsunamis, and heavy rains because each structural member is rooted deep into the ground and becomes an integral part of the earth. The construction method is not only vibration-free and noise-free, but also requires no temporary work, making it possible to rapidly build the desired structure with saving space while significantly reducing carbon dioxide emissions. The simple process of installing structural members manufactured at the plant on site makes it the most suitable method for automation of construction.

Expectations for the future of IPA are even higher and its responsibilities are also heavier. We have to take each of the advantages of the press-in principle as an academic subject and prove them through science and develop new construction methods and structures based on the outcomes of the research, and utilize them for the benefit of all the people around the world. In order to achieve this goal, it is necessary to gather a wide range of wisdom from all over the world and to promote result-oriented activities.

Lastly, I would like to express my respect and gratitude to all the engineers and researchers who are dedicated to the research in Press-in Engineering all the time, and to all the people who have made great efforts in this field.

Messages from Successive Presidents

Malcolm Bolton

Founding President (2007-2015)

Professor Emeritus, The University of Cambridge

I have the honor to send this message as the founding chairman of the IPA, retired from the post in 2015. And I extend my sincere congratulations on the 15th anniversary of the IPA establishment. I'm certain that I could celebrate the commemorable occasion thanks to my successors, Dr. Osamu Kusakabe and Dr. Leung Chun Fai, and also everyone who continuously support IPA for a long time. The most salient feature of my 10 years with the IPA was equally the highlight of my previous 28 years collaborating with GIKEN LTD. – the ongoing development of press-in technology to serve the changing requirements of the construction industry as it responds to new priorities set by society.

When the IPA was founded, the main emphasis was on efficient and socially responsible urban reconstruction, exploiting the precision and speed of the GIKEN technology of silent piling and, in appropriate installations, the ingenuity of the Reaction Base System to establish a footprint-free production line. Early IPA Seminars in Kochi focused on identifying fundamental soil-pile interactions and predicting press-in performance, capitalizing on the research collaboration between Cambridge University and GIKEN. This fundamental research continues, in the hands of Dr Stuart Haigh and Mr. Yukihiro Ishihara. Both installation issues and the performance of finished implant structures have been addressed.

More recently, and especially after the terrible 2011 Tohoku earthquake and tsunami, the theme of disaster prevention became important, with particular emphasis on flood mitigation. The political will to improve tsunami disaster resilience in the southwest of Japan was very clearly expressed in a presentation to the 7th IPA Press-in Seminar in July 2014 by the ex-Governor of Kochi Prefecture, Mr. Masanao Ozaki. Meanwhile, the massive effort that had been devoted by GIKEN to the development of the Gyro Piler, which is capable of coring through old foundations and hard ground to embed large diameter steel tubes to form an interconnected sea wall, was coming to fruition in new coastal defenses to mitigate any future Nankai mega-earthquake and tsunami. The imperative to protect coastal communities against such threats has, no doubt, been mainly responsible for the attendance at the annual Kochi Press-in Engineering Seminars increasing significantly. And the same imperative led GIKEN to support a further PhD student at Cambridge, Mr. Srikanth Madabhushi, who has been testing physical models of implant wall systems under lateral load in the large Cambridge beam centrifuge. Very interesting results are emerging which will add confidence in designing such structures in future.

An initiative has also been taken to deliver the "I" in IPA, making both research and application more relevant internationally. A series of biennial International Workshops was inaugurated in Cambridge in 2007, followed by New Orleans in 2008, Shanghai in 2010, Singapore in 2012 and Ho Chi Minh City in 2014. Following a call for proposals, IPA Research Awards were allotted at each Workshop, and the findings presented at the succeeding Workshop. Each International Workshop also featured lectures and visits relevant to their location, as well as presentations on the state of the art of Press-in technology and its recent applications. A field visit in New Orleans, to look at the urgent raising of flood defenses after the catastrophic flooding caused by hurricane Katrina, remains in my mind. We saw, in real time, the haphazard rate of construction of a traditional hammered sheet pile wall, in comparison with a second contract just a few hundred meters away where press-in piles were being installed smoothly and much more rapidly.

Each of the International Workshops has generated proceedings that have been published as a Press-in Engineering volume. All this research and practice has now been amalgamated into the "Design and Construction Guideline for Press-in Piling" in Japanese and "Press-in retaining structures: a handbook" in English, respectively. Currently, multilingualization of the latter publication is ongoing and to be published in the near future. The international dissemination of press-in technology will remain a key feature of the IPA mission in the years ahead. I look forward to assisting where I can.

May the IPA continue to flourish!

Messages from Successive Presidents

Osamu Kusakabe

Second President (2016-2019)

Executive Director (2020-)

Professor Emeritus, Tokyo Institute of Technology

It is my great honor and pleasure to send this message on the IPA 15th anniversary.

I first came to know, in 2005, that there is a move to setup a sort of organization of press-in piling. Dr. Kohzoh Tagaya, then an Emeritus Professor at the Kochi Technical College, asked me on my personal view on possible establishment of a learned society related to press-in piling at a lobby of the hotel where the 16th International Conference on Soil Mechanics and Geotechnical Engineering was being held at Osaka, Japan. My first reaction was to recommend him to setup a technical committee within International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE), because my understanding at that time was that press-in piling was emerging as a promising new piling method.

Two years later, a piece of request came to me from GIKEN LTD., asking me to join the inaugural ceremony of International Press-in Association (IPA) to be held in Cambridge University in February in 2007. Cambridge is the place where I studied as a graduate student many years ago, and I happily accepted the request. The venue was Moller institute newly built in the campus of Churchill College where I lived during my PhD student time from 1979 to 1982. Soon after I arrived at a room at the Moller institute late evening, there was a telephone call, asking me to join a dinner party at Trinity College, where Prof. Malcolm Bolton, Mr. and Mrs. Kitamura and other participants were already having a good time.

Next day, on February 16, 2007, the IPA constitution was presented at the inaugural ceremony. I realized that the objective of the IPA seemed very much challenging. The constitution stated that the IPA aims to cover not only geotechnical engineering, but also multi-disciplines related to press-in piling including geotechnical engineering, mechanical engineering, information engineering, environmental engineering as well as construction methodology. I realized then the reason why my suggestion to form a technical committee within ISSMGE had not been accepted. What immediately occurred to my mind, however, was that the actual operation of the IPA would be tough and challenging, because the historical development of modern science clearly indicates the process of fragmentation of discipline towards narrower and narrower, and deeper and deeper into a small subject. The IPA tries to go in an opposite direction towards the process of integration of discipline in a holistic manner. Real construction process is, in fact, the process of integration, requiring engineers with various disciplines. Modern construction practice greatly utilizes various construction machines with respective experienced operators. Thus, construction site is a typical example of the integration of machine and operator.

My role in the IPA in the first several years was not so hectic and mainly just to attend a series of press-in seminar in Kochi once a year, giving a brief speech at the closing ceremony both in Japanese and English. My role also included to attend press-in workshop held overseas every other year, giving an informal speech at the banquet. I had opportunities to attend the press-in workshop at New Orleans in 2008, Shanghai in 2010 and Singapore in 2012.

My real challenge started when I took over the role of Presidency from the Founding President, Prof. Malcolm Bolton, in 2016. Before accepting the role, I wrote a memorandum down on an A4 size paper in October 2015, which listed my plan on various aspects of IPA, ranging from reviewing the constitution and publishing technical books such as an introductory book, quarterly Newsletters, to organizing an international conference, seminar and establishing technical committee. Thanks to kind supports from many IPA members, most of my challenging plans have been materialized in my term of Presidency, as was reported in the Newsletter Vol.5, No.2 in 2020.

But there are two exceptions which are not materialized yet. The exceptions are (1) to publish a comprehensive technical book on press-in piling in Japanese for Japanese construction market, and (2) to form an industrial association like the Japan Press-in Association now consisting of more than 200 press-in piling companies, in various regions across the globe.

The item (1) could be possibly prepared, based largely on the contents of State-of-the-Art Report presented at the 2nd International Conference on Press-in Engineering (ICPE), in 2021. It is my hope that the authors of the State-of- the- Art-

Report could offer an effort to achieve this plan.

Regarding to the item (2), we may require some more time until the press-in piling market becomes mature enough to attract piling contractors to form an association in a region. On-going project of multilingualization of the Press-in Handbook into French, Russian, Portuguese, Thai, and Vietnamese on top of existing English and Chinese version, will certainly facilitate and accelerate the process of the item (2). It is very much promising that my successor, Dr. Leung Chun Fai, has a plan to continue the project of multilingualization to cover ten different languages in total.

During my term of four years, I always bore my feeling at the inaugural ceremony in mind, how to operate the IPA activities meeting the key objective, that is, the integration of multi-discipline. Towards the integration, IPA has recently initiated two projects related to integration of machine and operator. There was a series of IPA Newsletter article on historical development of press-in piling from Vol.5, No.3 to Vol.6, No. 1. They are now being complied and edited to form a booklet entitled “A brief development history of press-in machinery” to be ready for distribution in the fiscal year of 2021, which forms a part of IPA 15th anniversary project.

IPA also established a technical committee TC5 on “Influence of operator skill and experiences on field performance of Press-in Piling” in 2020. The paper presented at the 2nd ICPE concludes that operator's experience and skill play an important role for effective press-in piling with a minimum risk for damaging the press-in piling machines. Further efforts must be made to fill the gap between machine and operator, and between design office and actual construction site to achieve the integration.

Towards the end of my term, COVID-19 started spreading globally. This pandemic has made impossible executing various face to face events, including Board Meeting, seminars, and 2nd ICPE. Thanks to ICT technology, IPA is overcoming the difficulty in having face to face events and on-line meetings are now in common in IPA operation, facilitating more participation to IPA activities from various parts of the world.

Looking back to my fifteen years involvement in IPA, obviously, it appears that my four years term of Presidency was not enough to achieve the ultimate objective of IPA, that is the integration of discipline, integration of machine and engineer/operator. I am sure that the following Presidents will continue to pursue this challenge years ahead.

Message from Current President

Chun Fai Leung

Third President (2020-)

Professor Emeritus, National University of Singapore

It is with great privilege and pleasure in the capacity of the current IPA President, I have written this message to commemorate the 15th Anniversary of the Association. Taking over the Presidentship of the Association in June 2020, I must first thank the great contributions of Founding President Prof Malcolm Bolton and Immediate Past President Prof Osamu Kusakabe, both are my good friends whom we know each other for a long time. Malcolm had laid a very strong foundation for the Association spreading many international workshops and seminars on press-in piling and bringing IPA into the international limelight. Osamu continued the great work and one of his key contributions is the inauguration of the International Conference on Press-in Engineering. This inaugural conference held in Kochi, Japan, in 2018 attracted over 400 participants worldwide providing a much higher level of interaction among researchers and practicing engineers involved in press-in Engineering. Osamu also spearheaded several important publications including the very practical and insightful Press-in Retaining Structures Handbook second edition.

When I took over in June 2020, the world was at the height of COVID-19 pandemic which is still prevalent in many parts of world today. As such, all the IPA activities during my Presidency were held on-line, and a couple of face-to-face international seminars have to be postponed. Despite the above-mentioned adverse situation, I am pleased to report that the Second International Conference Press-in Engineering held on-line in June 2021 attracted 430 participants. The number slightly surpasses the attendance of the inaugural conference in 2018 and this is indeed a significant achievement during the present difficult time. As such, I wish to express my sincere thanks and appreciation to the tremendous efforts by the Conference Organizing Committee. In addition, the above-mentioned Handbook has been published in English and the translation of the Handbook in different languages including French, Russian and other languages is in progress with an aim to outreach to a much wider international community. During this challenging period, the IPA Newsletter is a key channel of communication among IPA members and the researchers and practicing engineers involved in press-in engineering worldwide.

With a large number of persons already vaccinated in many countries, some countries are now preparing to open up. When circumstances permit, it is planned that the 15th Anniversary celebration of IPA to be held sometime in 2022 can be conducted in hybrid mode (face-to-face and on-line) to facilitate more personal interactions globally and reach out to persons who still cannot travel. The international seminars planned for 2020 will be resumed once the COVID-19 situation is under better control in the host cities. More hybrid events are being planned.

As IPA President, one of my aims is to expand the association to areas beyond technology. Press-in Engineering is well developed in some countries while not so well utilized in other countries. A major concern is on the costing issue. It is planned that new Technical Committees will be set up to provide inputs and reviews on press-in engineering holistically in different parts of the world covering innovation and advancement of machine technology, safety and reduction of time over other existing methods, personnel and management, and cross-country and local budgeting issues. Having a holistic consideration, I trust that press-in engineering technology can be further promoted and developed in the countries yet to utilize press-in technology.

IPA has gone from strength to strength since its founding in 2007. With IPA reaching its 15th Anniversary milestone, I sincerely wish that IPA will continue to flourish in many years to come and members can celebrate many more anniversaries in the future.

Chapter 2

Activities

Research Committee

- The Research committee is one of the standing committees and was established in 2017. The chairs and co-chairs from 2017 until now were shown in the below.

Term	Chair	Co-chair
2017-2018	Tatsunori Matsumoto	Stuart Haigh
2019-	Yoshiaki Kikuchi	Stuart Haigh and Kenneth Gavin

- Terms of reference were approved by the Board of Directors meeting in 2021 as follows.

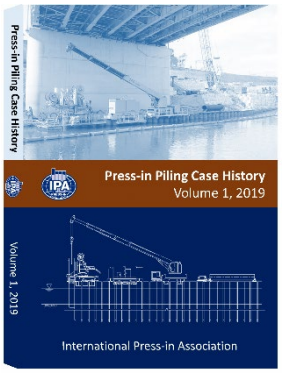
1) Identify relevant research subjects with consideration of Academia-Industry fusion
2) Form research groups to each research subject as a new Technical Committee
3) Coordinate Technical Committees for steady research activities, and encourage TCs for publishing research outcomes and/or holding a symposium
4) Allocate and manage the research budget for activities of Technical Committees
5) Encourage and support Technical Committees to apply for outside research funds available
6) Gather case histories for publishing Case History Volume
7) Plan and organize IPA Press-in Engineering Seminar

- Activities

Technical Committees (See Details from P10 to P22)

TC1	Application of cantilever type steel tubular pile wall embedded to stiff ground (Ended)
TC2	Estimation of Subsurface Information from Data Obtained during Press-in Piling (Ended)
TC3	Expansion of Applicability and Assessment of Seismic Performance of PFS Method (Ended)
TC4	Vertical performance and construction management of sheet piles installed by the Press-in Method and tubular piles installed by Rotary Cutting Press-in Method
TC5	Influence of operator skill and experience on field performance of Press-in Piling
TC6	Investigation and analysis of the development status of Press-in technology in China

Case History Volume



Volume 1, 2019

IPA Press-in Engineering Seminar

11th IPA Press-in Seminar 2019 in Tokyo

Technical Committee (TC1)

- Committee Name: Application of cantilever type steel tubular pile wall embedded to stiff ground
- Chair: Jiro Takemura (Director of International Press-in Association, Associate Professor of Tokyo Institute of Technology)
  Secretary General: Kouhei Sawada (Taisei Co., Ltd.)
- Members: 18
- Period: From FY 2017 to FY 2020 (Ended)

Fig. 1

➢ Background and Objectives

Thanks to the innovative pile installation method, like Gyro-press, the applicability of cantilever type tubular steel pile walls have increased significantly, e.g., large diameter pile in very hard ground (Fig.1). For relatively large wall height, large diameter and high stiffness piles are preferably used for stiff embedment ground, since the wall top displacement caused by the wall deformation can be minimized. However, the current design method of the embedded cantilever retaining wall has been developed for the relatively flexible steel sheet pile wall into soft grounds. Therefore, simple application of the current design method to this type of wall may require unnecessary embedment depth, or increase a risk of failure. IPA Technical Committee TC1 was set up to answer the above questions and establish a rational design procedure of embedded cantilever tubular pile wall as the final goal. TC1 has three objectives as terms of reference for four years committee period from FY 2017 to FY 2020.

1) To clarify the behavior of large-diameter tubular steel pipe wall in stiff ground using centrifuge model tests.
2) To propose new rational design method over the simple beam model supported on elastic springs.
3) To implement activities to support young engineers and researchers associated with foundation structure for their capacity building.

➢ Activities

Four working groups were created in TC1 and conducted the tasks as shown below.

♦ **WG1 on design method:**

- ✓ To analyze present design methods, and identify the issues, such as, embedment depth, soil characteristics, and seismic design.
- ✓ To analyze the design procedure of existing large diameter tubular steel pipe walls.
- ✓ To propose new rational design method of large diameter tubular steel pile wall including seismic design.

♦ **WG2 on centrifuge model tests:**

- ✓ To clarify mechanical behavior of large diameter tubular steel pile wall subjected to static load in stiff grounds.
- ✓ To analyze the influences of critical conditions, such as, embedment depth, ground stiffness and strength on the behavior of wall.
- ✓ To discuss the difference between the behavior of actual structures and that predicted by the simplified design model.
- ✓ To simulate the deformation and failure behavior against earthquake load.

♦ **WG3 on numerical analyses:**

- ✓ To verify and calibrate 3D FEM method by centrifuge modeling.
- ✓ To analyze the detail and local behavior of wall and ground, which cannot be observed in the centrifuge model tests.
- ✓ To analyze the influence of parameters on the behavior of large diameter tubular steel pile wall using subgrade reaction method with bi-linear p-y curve and 2D FEM.

♦ **WG4 on case study of construction:**

- ✓ To collect construction cases with design details as many as possible.
- ✓ To collect the data observed during and after construction, if available, with the collaboration of TC2.
- ✓ To identify the concerns in the actual construction, in particular on the cost and time.

➢ Outcomes

■ Seminar presentations

May 2018	IPA Seminar on Press-in Technology in Thailand
May 2018	IPA Seminar on Press-in Technology in Philippines
November 2018	IPA Seminar on Press-in Technology in Sao Paulo, Brazil
November 2020	12th IPA Press-in Seminar 2020 in Tokyo
June 2021	The Second International Conference on Press-in Engineering 2021, Kochi, Japan (ICPE2021)

Fig. 2. Associate Prof. Takemura made the presentation in Philippines

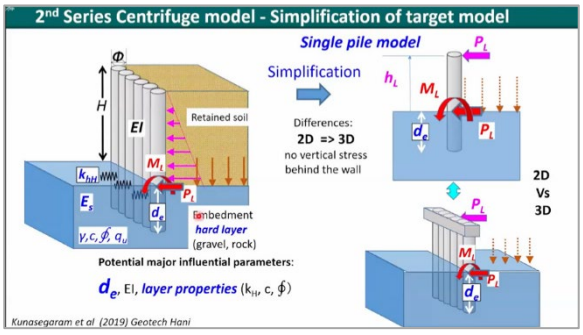


Fig. 3. Presentation data of the ICPE2021

■ Publications

September 2018	Proceedings of the First International Conference on Press-in Engineering ・Evaluation of Deformation Behavior of Self-Standing Retaining Wall Using Large Diameter Steel Pipe Piles into Hard Ground. (WG1) ・Issues for the Reduction of the Embedded Length of Cantilevered Steel Tubular Retaining Wall Pressed into Stiff Ground. (WG1) ・Behavior of a Large Diameter Piles Subjected to Moment and Lateral Loads. (WG2) ・Stability of Self-Standing High Stiffness-Steel Pipe Sheet Pile Walls Embedded in Soft Rocks. (WG2) ・Overview of the Self-standing and High Stiffness Tubular Pile Walls in Japan. (WG4)

November 2019	Proceedings of Geotech Hanoi 2019 ・Centrifuge Model Study on Cantilever Steel Tubular Pile Wall Embedded in Soft Rock. (WG2) ・Numerical simulation for centrifuge model tests on the stability of self-standing steel pipe pile retaining wall by Rigid Plastic FEM. (WG3) ・Analytical evaluation of deformation behavior of cantilever type retaining wall using large diameter steel tubular piles into stiff ground. (WG3)
June 2021	International Journal of Physical Modelling in Geotechnics, Vol.21 no.3, 114-134. Deflection and failure of high-stiffness cantilever retaining wall embedded in soft rock (WG2).
June 2021	Proceedings of the Second International Conference on Press-in Engineering ・State of the art report on application of cantilever type steel tubular pile wall embedded to stiff grounds ・Numerical simulation for centrifuge model tests on cantilever type steel tubular pile retaining wall by rigid plastic FEM (WG3) ・Reliability analysis on cantilever retaining walls embedded into stiff ground (Part 1: Contribution of major uncertainties in the elasto-plastic subgrade reaction method) (WG1,WG4) ・Reliability analysis on cantilever retaining walls embedded into stiff ground (Part 2: Construction management with piling data) (WG1, WG3) ・Dynamic behavior of cantilever tubular steel pile retaining wall socketed in soft rock (WG2) ・A centrifuge model study on laterally loaded large diameter steel tubular piles socketed in soft rock (WG2) ・Summary of case histories of retaining wall installed by rotary cutting press-in method (WG4)
March 2021	IPA News Letter (Volume 6, Issue 1)

Technical Committee (TC2)

- Committee Name: Estimation of Subsurface Information from Data Obtained during Press-in Piling
- Chair: Osamu Kusakabe (President of International Press-in Association)
  Secretary General: Yukihiro Ishihara (Director of International Press-in Association, GIKEN LTD.)
- Members: 9
- Period: From FY 2016 to FY 2017 (Ended)

Positions and affiliations are as of the date of the TC2.

➢ Research Subject

♦ Press-in method utilizes static pressure by hydraulic cylinders for jacking a pile into the ground. Actual press-in operation often adopts serval cycles of press-in and pull-out processes (sometimes called as surging). With these features, if continuous measurements of the hydraulic pressure were applied and the pile penetration depth were performed, the data thus obtained (Press-in piling data) could be used for driving control and even for evaluating subsurface information. Fig. 1 illustrates the concept of the use of Press-in piling data. TC 2 focused on subsurface investigation technique in the figure.

♦ TC2 dealt with Standard Press-in, Press-in with Augering and Rotary Cutting Press-in. The proposed methods of estimating SPT N from the piling data may be briefly summarized as follows. In Standard Press-in, a pile is installed with a static jacking force and the process of the penetration of a pile is similar to that of a cone in CPT. Taking advantage of this similarity, the base resistance Qb, and the shaft resistance Qs can be obtained by subtracting Qb from the head load Q. Then they can be converted into CPT cone resistance (qc) and sleeve friction (fs) by considering the scale effect and the rate effect on Qb. Subsequently, the soil type and SPT N can be estimated based on the methods developed by Robertson and other researchers. Regarding Press-in with Augering, two methods to estimate SPT N values were proposed based on the knowledge in the field of rock drilling. The first one uses the proportional correlation between the parameter $Tb/(dc)\gamma$ and the unconfined compressive strength of a rock where Tb is the torque on the auger head, dc is the depth of cut (ratio of downward to rotational velocity) and γ is a constant. The second method adjusts the parameters used in the technique of Measurement While Drilling to link the resistance on the auger head with SPT N values. In Rotary Cutting Press-in, SPT N values are estimated by assuming a proportional correlation between the SPT N values and the energy (δE) required for deforming a soil below the pile base by a volume of δV. This assumption is based on the knowledge of the linear correlation between the Specific Energy (= $\delta E / \delta V$) in rock drilling and the unconfined compressive strength of the rock. The calculation of the Specific Energy requires the information of the resistance on the pile base. The processes of estimating SPT N from the piling data in Standard Press-in and Rotary Cutting Press-in are summarized in Fig. 2.

➢ TC Activities

♦ Prior to the establishment of TC2, there already existed ample technical information and papers related to the subject were published. Thus, the actual task of TC2 was to put the information available together into a technical document which was subject to thorough review by the committee members consisting of various experts both academic and practitioner. Mr. Ishihara, Secretary of TC2 took a lead for drafting the technical document. After several revisions considering the comments from the members, TC2 successfully published the technical document entitled “Technical Material on the Use of Piling Data in the Press-in Method, I. Estimation of Subsurface Information” in Japanese in 2017.

♦ English version of the above Technical Material published in Japanese is under preparation by TC4.

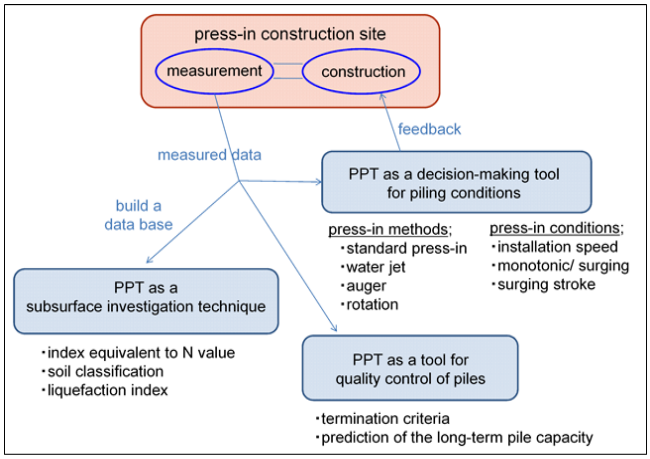


Fig. 1. Concept of the use of press-in piling data

Fig. 3. Mr. Ishihara made a presentation in the 11th IPA Press-in Seminar

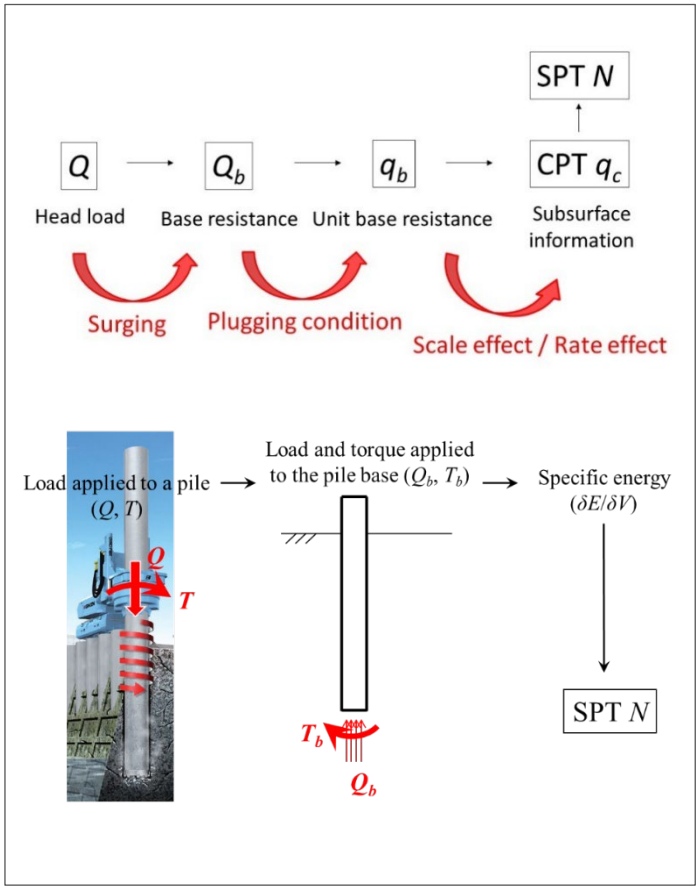


Fig. 2. Processes of estimating subsurface information from piling data

➢ Outcomes

■ Seminar presentations

September 2019	11th IPA Press-in Seminar 2019 in Tokyo (Fig. 3)
June 2021	The Second International Conference on Press-in Engineering 2021, Kochi, Japan (ICPE2021)

■ Publications

November 2017	Technical document: Technical Material on the Use of Piling Data in the Press-in Method, I. Estimation of Subsurface Information, 63p. (in Japanese) (Fig. 4)
June 2021	State of the Art Report: Y. Ishihara and O. Kusakabe (2021), Use of press-in piling data for estimating subsurface information, Proceedings of The Second International Conference on Press-in Engineering, pp.42-66.
February 2022	Development of PPTs, Chapter 3, A brief development history of press-in machinery, IPA Booklet, pp. 31-36.

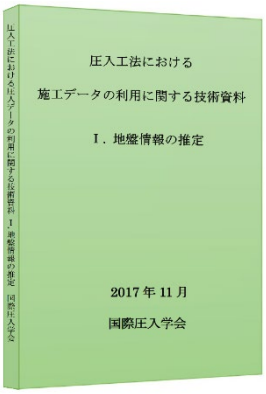


Fig. 4

Technical Committee (TC3)

- Committee Name: Expansion of Applicability and Assessment of
  Seismic Performance of PFS Method
- Chair: Jun Otani (Director of International Press-in Association, Professor of Kumamoto University)
  Secretary General: Shinji Taenaka (Nippon Steel Corporation)
- Members: 33
- Period: From FY 2017 to FY 2020 (Ended)

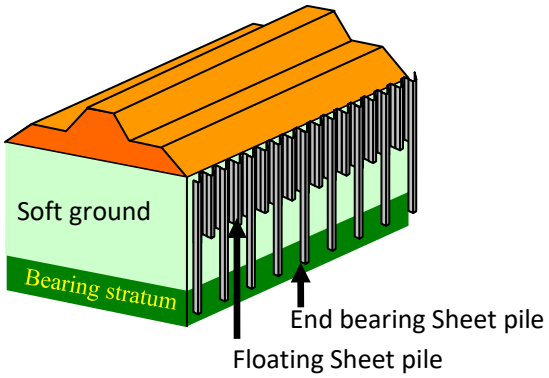


Fig. 1

➢ Overview

The steel sheet-pile method has long been used as a temporary construction work but in recent years, it has been used as a permanent structure. The Partial Floating Sheet-pile (PFS) method is one of the methods to install sheet piles near the tow of the embankment as a countermeasure of ground subsidence due to river embankment construction on soft ground, and this method is a partially floating sheet-piles with the combination of the end bearing sheet-piles and can be easily realized its cost effectiveness and construction feasibility. Regarding the steel sheet-pile method, the effectiveness under the earthquake motion has been also reported in the Great East Japan Earthquake (2011) and the 2016 Kumamoto Earthquake in Japan but there are still the needs for the quantitative discussion to clarify the effectiveness.

The Technical Committee focuses on the PFS Method and aims to develop the method realizing cost effectiveness and construction feasibility contributing to enhancement of national resilience, and also to promote this method worldwide with offering the relevant information.

➢ Activities

In this Technical Committee under the International Press-in Association, the PFS method is on the discussion and the aims of this committee is to propose the quantitative scope of application such as lateral displacement and also to discuss its effectiveness and performance under the earthquake. Specifically, as an activity for four years from 2017, the following items of references are shown.

1) To reconsider the quantification of the lateral displacement of the ground as a condition for the use of countermeasures against settlement
2) To discuss the precise performance of PFS method under the earthquake
3) To propose guidelines for design manual of PFS method
4) To disseminate this method in Asia

In this committee, as shown in the committee list to be shown later, participants from industry, government, academia, stakeholders and experts were involved. We established five WG (Working Group) with the aim of making the missions of the committee clear. Those are as follows.

- **Survey WG**：Accumulation and analysis of actual site data for the performance of the sheet-piles
  - Evaluation of actual site data and applicability analysis (Kyushu Area, Japan), etc.
- **Experiment WG**：Study by centrifugal model test
  - Evaluation of seismic behavior of PFS Method in sandy and cohesive soils, etc.
- **Analysis WG**：Study by numerical analysis
  - Lateral flow effect of cohesive soil and seismic performance evaluation under earthquake, etc.
- **Design WG**：Study on the design method
  - Reevaluation of applicability, study on introduction of aseismic design, and design examples
- **Overseas WG**：Having seminar(s) worldwide
  - Plan for international activities
    e.g., Promotion PFS Method, Education for local researchers and engineers, etc.

➢ Achievements

■ Symposia in Overseas

Oct. 2017	Steel Sheet-Pile Symposium in Vietnam (HCMCUT, Ho Chi Minh)
Dec. 2018	Steel Sheet-Pile Symposium in Malaysia (UTHM, Batu Pahat)
Oct. 2019	Steel Sheet-Pile Symposium in Thailand (KMUTT, Bangkok)

Fig. 2. Symposium in Vietnam

Fig. 3. Symposium in Malaysia

Fig. 4. Symposium in Thailand①

Fig. 5. Symposium in Thailand②

Seminar & International Conference

Nov. 2020	12th IPA Press-in Seminar 2020 in Tokyo
Jun. 2021	The Second International Conference on Press-in Engineering 2021, Kochi, Japan (ICPE2021) *Online Conference

Presentations & Research Papers

Otani, J. 2017. A new sheet-pile method for countermeasures against the settlement of embankment on soft ground (Development of PFS Method), IPA News Letter, Vol. 2, Issue 3, pp. 8-10.

Tung, D. D. 2017. Steel Sheet-Pile Seminar in Vietnam on October 25, 2017. IPA News Letter, Vol. 2, Issue 4, p.21.

Yusoff, N. A. 2018. Steel Sheet-Pile Symposium in UTHM, Malaysia, on December 6, 2018. IPA News Letter, Vol. 2, Issue 4, p.21.

Kitiyodom, P. 2020. IPA-TC3 Steel Sheet-pile Symposium in KMUTT, Thailand, on October 31, 2019. IPA News Letter, Vol. 5, Issue 1, pp. 20-22.

Hizen, D., Kijima, N. and Ueno, K. 2018. Centrifuge model tests and image analysis of a levee with partial floating sheet-pile method. Proc. of 1st ICPE 2018 Kochi, pp. 215-220.

Nakai, K., Noda, T., Taenaka, S., Ishihara, Y. and Ogawa, N. 2018. Seismic assessment of steel sheet pile reinforcement effect on river embankment constructed on a soft clay ground, Proc. of 1st Int. Conf. on Press-in Engineering, pp. 221-226.

Yamamoto, S., Kasama, K., Ohno, M., Tanabe, Y. 2018. Seismic behavior of the river embankment improved with the steel sheet piling method. ICPE2018, pp. 227-232.

Fujiwara, K., Nakai, K. and Ogawa, N. 2019. Quantitative evaluation of PFS (Partial Floating Sheet-pile) Method under liquefaction、Duc Long P., Dung N. (eds) Geotechnics for Sustainable Infrastructure Development. Lecture Notes in Civil Engineering, vol 62. Springer, Singapore.

Kasama, K., Ohno, M., Tsukamoto, S. and Tanaka, J. 2019. Seismic damage investigation for river levees reinforced by steel sheet piling method due to the 2016 Kumamoto earthquake, International Conference on Geotechnics for Sustainable Infrastructure Development (GEOTEC HANOI 2019).

Fujiwara, K., Mallyar, E. 2021. Experimental study for liquefied soil in a gap between underground walls. ICPE2021, pp. 358-363.

Kasama, K., Fujiyama, H. and Otani, J. 2021. 3D fem analysis of partial floating steel sheet piling method on two-layered ground, ICPE2021, pp. 352-357.

Nakai, K., Fujiwara, K. and Ogawa, N. 2021. Seismic performance evaluation of PFS method by soil-water coupled finite deformation analysis. International Journal of GEOAMTE, (in-press).

Ogawa, N., Fujiwara, K. and Nakai, K. 2021. Analytic considerations on two-dimensional modeling of partial floating sheet pile method. International Journal of GEOMATE, (in-press).

Otani, J. 2021. State of the art report on steel sheet pile method in geotechnical engineering -development of PFS method. ICPE2021, pp. 67-85.

Fujiwara, K., Ogawa, N. and Nakai, K. 2021. 3-D numerical analysis for partial floating sheet-pile method under liquefaction, Journal of JSCE, Vol. 9, No.1, pp. 138-147.

Technical Committee (TC4)

- Committee Name: Vertical performance and construction management of sheet piles installed by the Press-in Method and tubular piles installed by Rotary Cutting Press-in Method
- Chair: Stuart Haigh (Director of International Press-in Association, Professor of The University of Cambridge)
  Co-chair: Tatsunori Matsumoto (Vice President of International Press-in Association, Honorary Professor of Kanazawa University)
  Secretary General: Yukihiro Ishihara (Director of International Press-in Association, GIKEN LTD.)
- Members: 27
- Period: From FY 2019 to FY 2022 (planned)

➢ Overview

Recently, sheet piles have been known to be effective not only for temporary but also for non-temporary structures, and the Press-in Method is often chosen in a dense area mainly due to its lower noise and vibration as well as its spatial efficiency. The piles installed by Rotary Cutting Press-in, which can be embedded in a hard ground, are increasingly expected to be utilized not only for retaining structures but also for foundations. However, the design methods of piles installed by these methods have not been well prepared, which has been restricting their practical use. Several researches revealed the high vertical performance of the pressed-in piles compared with piles installed by other methods, but this advantage has not been incorporated into design, partly because the effect of the installation process has not been fully understood and partly because the load test database is limited. On the other hand, the piling data obtained in press-in piling has been shown to be used for estimating the subsurface information. The use of piling data could be expanded for assuring the pile performance.

To provide practical design methods for the pressed-in piles, this technical committee will investigate the existing researches on the vertical performance of the pressed-in piles and the design methods for pressed-in piles that are provided in limited fields. Focusing on the press-in method without the use of installation assistance (Standard Press-in, SP for short) and Rotary Cutting Press-in (RCP), it will aim at providing a recommendation for the construction management of the piling work and the estimation methods of the vertical performance of SP piles and RCP piles. To do these, activities will be conducted in three working groups: Construction Management WG, Vertical Performance Assessment (Japanese Issues) WG and Vertical Performance Assessment (International Issues) WG.

➢ Activities

Based on these backgrounds, this technical committee (IPA-TC4) will mainly work on the followings:

1) Establishing the estimation method of vertical performance and the method of construction management of SP piles,
2) Establishing the estimation method of vertical performance and the method of construction management of RCP piles,
3) Enhancing the reliability of the technique to estimate subsurface information from the press-in piling data and the translation of IPA-TC2 technical material into English,
4) Training young engineers and researchers who are engaged in Press-in Engineering.

➢ Achievements

■ Presentations & Research Papers

Ogawa, N. and Ishihara, Y. 2019. Discussion on the estimation of subsurface information from the press-in piling data of sheet piles. Japan Society of Civil Engineers 2019 Annual Meeting, 2p. (in Japanese)

Suzuki, N. and Ishihara, Y. 2019. Discussion on the method of estimating the second-limit-resistance of the pressed-in pile from the load-displacement relationship at the end of installation. Japan Society of Civil Engineers 2019 Annual Meeting, 2p. (in Japanese)

Suzuki, N. and Ishihara, Y. 2019. Case study on the application of press-in piling data to design and construction of pile foundations for reducing the expected total cost. International Conference on Case Histories & Soil Properties, Singapore, 16p.

Ishihara, Y., Ogawa, N., Mori, Y., Haigh, S. and Matsumoto, T. 2020. Simplified static vertical loading test on sheet piles using press-in piling machine. Japanese Geotechnical Society Special Publication, 8th Japan-China Geotechnical Symposium, pp. 245-250.

Zheng, T. 2020. The vertical and horizontal performance of pressed-in sheet piles. M. Eng. Thesis, University of Cambridge, 52p.

Ishihara, Y., Haigh, S. and Koseki, J. 2020. Assessment of base capacity of open-ended tubular piles installed by the Rotary Cutting Press-in Method. Soils and Foundations, Vol. 60, pp. 1189-1201.

Ishihara, Y. and Kusakabe, O. 2021. State of the art report on the use of press-in piling data for estimating subsurface information. Proceedings of the Second International Conference on Press-in Engineering 2021, Kochi, Japan, pp. 42-66.

Ishihara, Y., Eguchi, M., Brown, M. J. and Koseki, J. 2021. Comparison of penetration resistance and vertical capacity of short piles installed by Standard Press-in in loose sand. Proceedings of the Second International Conference on Press-in Engineering 2021, Kochi, Japan, pp. 260-271.

Zheng, T., Haigh, S. K., Dobrisan, A., Willcocks, F., Ishihara, Y., Okada, K. and Eguchi, M. 2021. The vertical and horizontal performance of pressed-in sheet piles. Proceedings of the Second International Conference on Press-in Engineering 2021, Kochi, Japan, pp. 138-148.

Toda, K. and Ishihara, Y. 2021. An investigation into vertical capacity of steel sheet piles installed by the Standard Press-in Method. Proceedings of the Second International Conference on Press-in Engineering 2021, Kochi, Japan, pp. 177-184.

Toda, K., Ishihara, Y. and Suzuki, N. Comparison of SPT-based design methods for vertical capacity of piles installed by Rotary Cutting Press-in. Proceedings of the Second International Conference on Press-in Engineering 2021, Kochi, Japan, pp. 169-176.

Brown, M. J. and Ishihara, Y. 2021. Predicting the capacity of push and rotate piles using offshore design techniques and CPT tests. Proceedings of the Second International Conference on Press-in Engineering 2021, Kochi, Japan, pp. 185-193.

Technical Committee (TC5)

- Committee Name: Influence of operator's skill and experiences on field performance of Press-in Piling
- Chair: Osamu Kusakabe (Executive Director of International Press-in Association)
  Co-chair: Kiyoshi Minami (Director of International Press-in Association, Muramoto Corporation)
  Secretary General: Masayuki Kitamura (GIKEN SEKO LTD.)
- Members: 12 (all Japanese, having ample experiences in press-in operation on site)
- Period: From FY 2020 to FY 2022

➢ Research Subject

- Field performance of press-in piling greatly depends both on performance of machine and on operators' experiences and skills. The operator's experience and skill play an important role in effective Press-in piling with minimum risk for damaging the machine. Firstly, TC5 tries to demonstrate the difference in Press-in piling operation between experienced and less experienced operators.

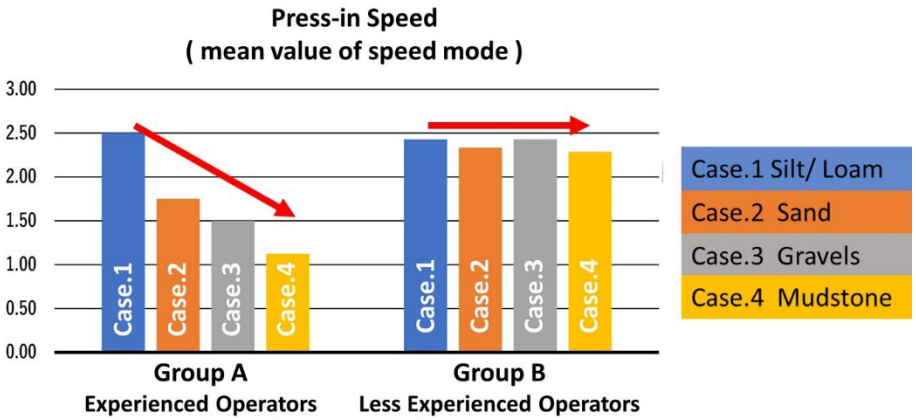
- The information gathered will be of vital importance for providing useful training material for beginners of Press-in piling, for future development of piling machines, and for machine designers. In near future, the accumulated know-how will become an essential database for developing an automatically operating system as a deep learning database based on AI technology.

➢ TC Activities

- A questionnaire survey was conducted on the field performance of press-in piling machine, with the special attention to Gyro Piler. 15 operators were selected from a piling company and were asked to fill in their answers in the sheet of questionnaire. The survey aimed at identifying how experienced operators select key Press-in parameters which would affect effective piling operation, depending on the type of soil profile and on the diameter of steel tubular pile. 21m long piles were assumed to be installed at 20m embedment. The four referenced soil profiles for this survey were selected, covering from soft clayey ground to stiff mudstone ground.

- The first-round survey was conducted during the period of April 2020 to May 2020 to examine the feasibility of the questionnaire items. Based on the results of the first-round survey, the items of questionnaire were reviewed and modified. The second-round survey was then conducted during the period of May 2020 to June 2020. Supplementally, some respondents were interviewed to clarify their answers.

- The questionnaire survey thus conducted revealed the interesting findings related to a picture of how operators use Gyro Piler on site in different soil profiles. It is clear that there is a tendency that the experienced and skillful operators carefully choose the values of initial setting of the machine operation and the number and arrangement of water lubrication system in order for smooth piling operation and for avoiding a possible risk of damaging the machine, taking into account the soil profile and the pile diameter. It is also noticed that the less experienced operators tend to select the similar initial setting values regardless of soil profiles. Figure 1 shows one of the results, demonstrating that less experienced operators select almost the same value regardless of the ground stiffness, while experienced operators set the press-in speed gradually lower as the ground becomes stiffer



Further survey is currently in progress to carry out for cases of other Press-in machines with another group of operators.

➢ Outcomes

■ Publications

T. Takeuchi, S. Sato, T. Takehira, M. Kitamura & H. Murashima (2021), Preliminary results of questionnaire survey on field performance of press-in machine, Proceedings of The Second International Conference on Press-in Engineering, pp. 558-565.

Technical Committee (TC6)

- Committee Name: Investigation and analysis of the development status of Press-in technology in China
- Chair: Ou Xiaoduo (Professor of Guangxi University)
  Secretary General: Guozhu Chen (GIKEN LTD.)
- Members: 11
- Period: From FY 2021 to FY 2023

Objectives

- It has been 10 years since Press-in technology was introduced into China, and there are nearly 300 construction cases. However, the collection and analysis of the construction cases are not systematic. Moreover, problems in the construction and the training of machine operators have become one of the major issues.

- Therefore, by collecting the construction cases of Press-in technology and investigating the construction problems, the problems in the development of Press-in technology in China are clarified and solutions are formulated.

Activity Plan

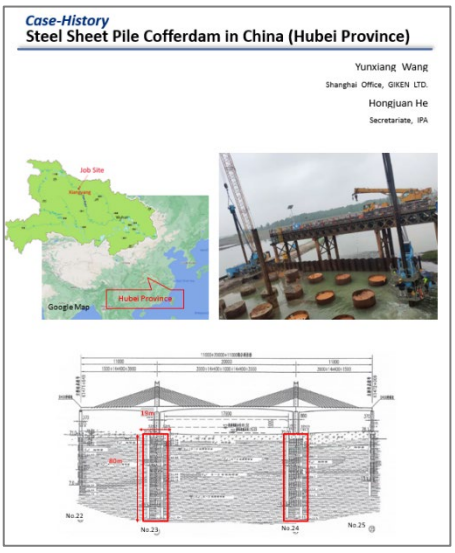
Activities	Outcomes（Planned）
Collection and analysis of case histories on Press-in Methods in China	・Contribute a series of case histories to IPA Newsletter; ・Building the database of construction cases with Press-in technology; ・Updating "Chinese version of「Press-in retaining structures: a handbook」"; ・Holding seminars
Investigation and solution of problems in constructions	Making the investigation report and the manual how to solve these construction problems

●静压植桩工程案例　　年 月 日

1.所有项目并非必填，但请尽可能详细的填写。
2.关于地质状况、基础构造等，也可以图纸形式提供。
3.提供照片、图纸、观测数据等，根据需要，请事先征得业主或总包的同意。

工程信息	工程名称		
	业主单位		
	总包单位		
	施工单位		
	工程地址		
	工程目的		
	施工环境（海、河、住宅区、街道）		
	工程整体工期		
	静压施工工期		
	地质信息	有无地勘资料	有 · 无（如果“有”，请附上详细资料）
		地层结构	
		N值、qt值等	
		地下水位	
		其他	
	基础构造 / 支护构造	结构形式	
		选用理由	
		设计时参照的规范、标准	
	桩/板桩	是否使用循环利用桩材	是 · 否
		型号	
		数量、长度	
		入土长度	
		焊接位置	

Format of the case histories collection



The case history which was published in Newsletter

Award Committee

➢ The IPA can recognize studies, technologies and practices which advanced the Press-in engineering and award honors. The Award Committee was established in 2017 to call for and receive nominations, review them and recommend candidates for awards to the Board of Directors for approval.

Term	Chair	Co-chair
2017-2018	Masaaki Terashi	Andrew McNamara
2019	Masaaki Terashi	Andrew McNamara and Limin Zhang
2020-	Andrew McNamara	Limin Zhang

➢ The current IPA Awards are:

■ **Outstanding Project Award:**

IPA recognizes and honors a project that exemplifies superiority of embedded structures/walls in meeting project requirements and public expectations.

♦ **2019 Award**

「Construction project of retaining wall adjacent to railway in Kyushu, Japan」

♦ **2021 Award**

「Emergency Bridge Abutment Repair with Pressed-in Pipe Piles 」

■ **Innovative Technology Award:**

IPA recognizes and honors innovative technologies that significantly contributed to the advancement of Press-in engineering.

♦ **2019 Award**

「Development of "Headroom restriction Clear Piler for ultra-low overhead clearance" and "steel sheet pile mechanical joint"」

♦ **2021 Award**

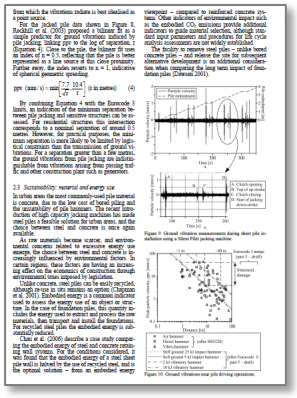
「Effective Utilization of Underground Space in Urban Area」(Underground automated mechanical bike stand)

Distinguished Research Award:

IPA recognizes and honors distinguished research outcomes that contributed to the advancement of Press-in engineering.

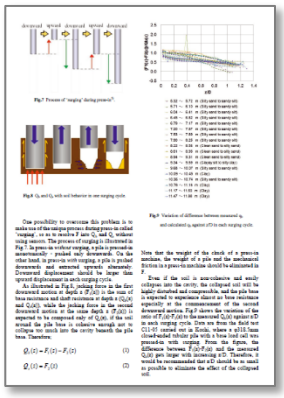
2019 Award

D.J. White and A.D. Deeks
「Recent research into the behaviour of jacked foundation piles」



2021 Award

Ishihara, Y. et al.
「Estimation of N Value and Soil Type from PPT Data in Standard Press-in and Press-in With Augering」



Life-long Contribution Award:

IPA recognizes and honors individuals who have made great contributions to the advancement of Press-in engineering for a long period of time.

2018 Award

- Mr. Akio Kitamura, the Executive Chairman of GIKEN LTD. and the honorary president of the International Press-in Association
- Late Mr. Yasuo Kakiuchi and Mr. Takaharu Kakiuchi, Former and current chairman of the Kakiuchi Ltd.
- Dr. Malcolm David Bolton, Emeritus Professor of the University of Cambridge, Ph.D. and a FREng.

2021 Award

- Dr. Masaaki Terashi, the Advisor of GIKEN LTD. and Director of IPA

The Award Ceremony in 2018

■ **ICPE Best Paper Award:**

The organizing committee and IPA jointly honor the best paper(s) submitted and included in the ICPE* proceedings.

*ICPE is the triennial International Conference on Press-in Engineering

♦ **2018 Award Ceremony at ICPE2018**

♦ **2021 Award Ceremony at ICPE2021 (Online)**

- ✓ The Press-in engineering is multi-disciplinary engineering for improving the planning, design and construction of embedded structures and walls. It covers, but not limited to, geotechnical engineering, environmental engineering, mechanical engineering, measuring-surveying-monitoring engineering, data and information processing.
- ✓ Before the establishment of the current award scheme, IPA awarded the IPA Research Grants once every two years to promising research proposals. The research outcomes were published in the Press-in Engineering 2009, 2011, 2013 and 2015.
- ✓ Furter details of the IPA Award may be found at: https://www.press-in.org/en/page/award

Publicity Committee

- The Publicity committee is one of the standing committees and was established in 2017. The chairs and co-chairs from 2017 until now were shown in the below.

Term	Chair	Co-chair
2017-2018	Yukihiro Ishihara	Michael Doubrovsky
2019-2020	Taro Uchimura	Michael Doubrovsky and Nor Azizi Yusoff
2021-	Yusoff Nor Azizi Bin	Michael Doubrovsky and Ramin Motamed

- Terms of reference were approved by the Board of Directors meeting in 2021 as follows.

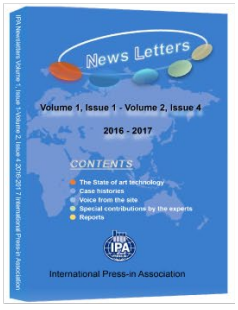
1) Increase IPA Membership working with Administration Committee
2) Publish IPA newsletter and its compact edition (IPA magazine)
3) Maintain and update IPA website
4) Work with Research Committee for publishing and disseminating research outcomes and Case History Volume
5) Develop a long-term plan for IPA publication, including multilingualization of the handbook
6) Plan annual public relations schedule

- Activities

IPA Newsletters

The “IPA Newsletter vol.1, 1” was first published on September 2016, sending out the latest information of Press-in Method. Since then, IPA Newsletter has been published quarterly (March, June, September and December) and delivered to over 2500 readers involved in Press-in Method like academic researchers and practical engineers.

Quarterly Issues ***Combined Version*** ***Special Issue for ICPE***



ICPE2018

ICPE2021

- **Case-histories**
- **Voice from the site**
- **Young Members Column**
- **Special contributions by the experts**
- **Directors’ research and development activities**
- **Reports & Event Dairy**

IPA Website

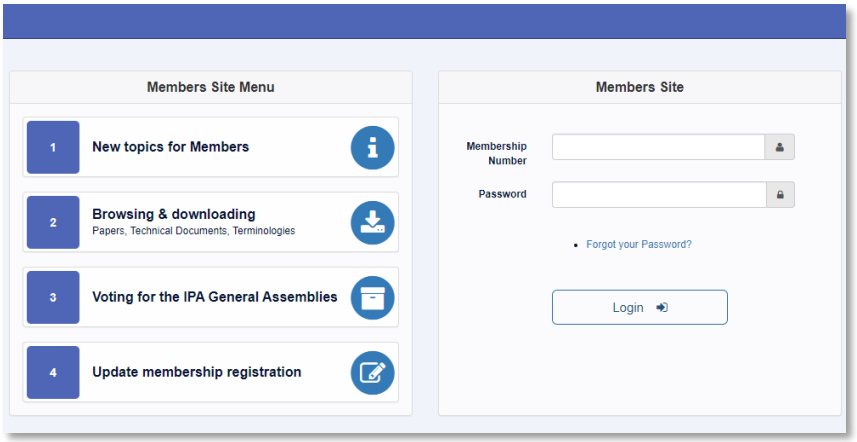
Website

- English and Japanese
- URL: https://www.press-in.org
- Renewed in 2017

Website

- Chinese
- URL: https://ipa-press.org/cn/
- Established in 2020

IPA Members Site



- English and Japanese
- URL: https://member.press-in.org
- Renewed in 2018

Development Committee

- The Development committee is one of the standing committees and was established in 2017. The chairs and co-chairs from 2017 until now were shown in the below.

Term	Chair	Co-chair
2017-2018	Jun Otani	Jiro Takemura
2019-	Jiro Takemura	Yukihiro Ishihara

- Terms of reference were approved by the Board of Directors meeting in 2021 as follows.

1) Plan and develop new activities of the IPA, and support the teams for these newly implemented activities.
2) Plan and organize seminars, symposia and lecture tours
3) Assist the organizing committee for the International Conference on Press-in Engineering (ICPE)
4) Utilize the Handbook at any chances of meeting and seminars

- Activities

■ IPA Seminars on Press-in Technology

Seminar	Date	Participants
IPA Seminar on Press-in Technology in Singapore	2 March, 2017	over 100
IPA Seminar on Press-in Technology in Malaysia	1 November, 2017	over 100
IPA Seminar on Press-in Technology in Thailand	18 May, 2018	103
IPA Seminar on Press-in Technology in Philippines	21 May, 2018	over 100
IPA Seminar on Press-in Technology in Vietnam	6 December, 2018	227

Seminar in Vietnam

Flyer of seminar

International Conference on Press-in Engineering (ICPE)

Conferences	Date	Participants
The First International Conference on Press-in Engineering 2018, Kochi, Japan	19 - 20 September, 2018	418 (from 17 countries)
The Second International Conference on Press-in Engineering 2021, Kochi, Japan (Online)	19 - 20 June, 2021	430 (from 19 countries)

Keynote Lecturers in ICPE

ICPE2018

Fumihiko Imamura
Professor, Tohoku University

Kenjiro Shimada
Team Leader, Komatsu Ltd.

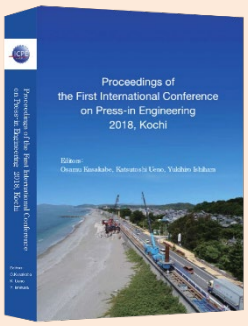
ICPE2021

Mark Randolph
University of Western Australia

Yozo Fujino
President, Josai University

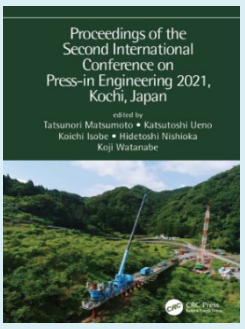
Proceedings

ICPE2018



- 83 papers
- 671 pages

ICPE2021



- 65 papers
- 600 pages

Administration Committee

- Due to the importance of the Administration committee, it was decided that Chair of the committee be IPA President and Secretary of the committee be IPA Secretary General.

Term	Chair	Secretary	Members
2017-2019	Osamu Kusakabe	Kazuyoshi Ishii	-
2020-	Chun Fai Leung	Hisanori Yaegashi	Osamu Kusakabe and Masaaki Terashi

- Terms of reference for Administration Committee were approved by the Board of Directors meeting in 2017 as follows.

1) Maintain Constitution, By-laws, and Regulations
2) Manage the General Assembly and the Board Member meetings
3) Assis Research Committee and Award Committee on administrative activities
4) Assist Publicity Committee to organize various activities on scheduling and coordination
5) Assist Development Committee to organize seminars and International Conferences
6) Manage financial matters on Budget and monthly cost control
7) Develop alliance or collaboration with other entities.

- Activities

♦ 2017-2019

As was specified in the terms of reference, the Administration committee was responsible for supporting activities of other four committees, reflecting the fact that other four standing committees were newly established, and that the manpower of the IPA Secretariate was rather limited. The Administration committee was also responsible for day-to-day management on various matters, thus the working load on the Administration committee was intense. Major achievements during the term may be summarized as follows.

1) Through the revisions of Constitutions and By-laws in 2018 and 2020, and the development of major regulations during the term, the management and operation of overall IPA activities becomes stable and easy to handle.
2) By strengthening the manpower of the Secretariat, the Secretariat was reformed, consisting of four sections (Public Relation Section, Research Support Section, Financial Section, Member Section) and regional office, enabling the Administration committee effective and easier administration.
3) By assisting Research Committee, Research Committee has established six technical committees, promoting research activity.
4) By assisting Publicity Committee, the editorial committee under Publicity Committee regularly publishes quarterly newsletters.
5) By assisting Development Committee, four Press-in Seminars were organized in Singapore, Malaysia, Thailand and Philippines, and the first International Conference on Press-in Engineering was held in 2018.

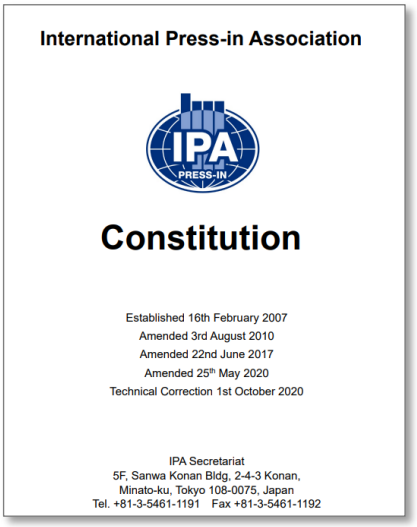
♦ 2020-

1) Continued to institutionalize the Secretariat in particular and the IPA as a whole.
2) Amendments to the Bylaws concerning the Nomination Committee were approved at the December email Board meeting.
3) Assist the Organizing Committee of ICPE 2021.
4) Worked as the engine for organizing events to commemorate the anniversary.

Board Meeting in 2017 (Kochi, Japan)

Board Meeting in 2019 (Tokyo, Japan)

Board Meeting in 2021 (Online)



International Press-in Association

IPA PRESS-IN

Constitution

Established 16th February 2007
Amended 3rd August 2010
Amended 22nd June 2017
Amended 25th May 2020
Technical Correction 1st October 2020

IPA Secretariat
5F, Sanwa Konan Bldg, 2-4-3 Konan,
Minato-ku, Tokyo 108-0075, Japan
Tel. +81-3-5461-1191 Fax +81-3-5461-1192

Constitution

With the COVID-19 situation not so good globally, much of the IPA activities were held online. Despite this, ICPE 2021 attracted over 400 participants and managed to break even. In view of the current COVID-19 situation, the 15th anniversary function will likely be held online in late February 2022 together with the IPA Newsletter for the 15th anniversary special edition. It hopes that face-to-face meetings/functions could resume by mid-2022.

Future development and practical applications of results achieved from IPA Scientific Grant Awards

Michael Doubrovsky
Professor, Odessa National Maritime University

Such interesting IPA initiative as Scientific Grant Awards was launched in 2007 just after IPA creation. This event has sustained 5 calls started in 2007, 2008, 2010, 2012 and 2014. At every call, submitted proposals were assessed by special IPA commission according to the established requirements. Selected proposals were awarded by IPA Scientific Grants at the special ceremony (as part of the IPA workshops). Winners were greeted and awarded by IPA Honorary President Akio Kitamura. In total there were 36 awarded studies in the field of research and 2 awarded studies related to the potential market survey of press-in piling in some regions. Almost all awardees were from universities (excepting 2 cases) located in 11 countries: Australia, China, Great Britain, Ireland, Japan, Malaysia, Netherlands, Singapore, Ukraine, USA, Vietnam (countries are named in alphabetical order). Awarded studies were fulfilled during 1-2 years depending on subject and provided funding.

5th Scientific Grant Award Ceremony

In order to analyze results achieved from IPA Scientific Grant Awards during 10-years research period of 2007-2017, we worked out related questionnaire and gained interesting information based on the structure presented in the following table.

Type of information	*Considered questions*
General	Title of the awarded research
	Years of awarding and research fulfillment
	Awardee(s)/Principal Investigator
Main results of the research	1. Scientific achievements and importance 2. Form of research results presentation • Scientific reports on IPA seminar and other conferences • Publications (articles, books, etc.)
Further development of the awarded research (after awarded period)	1. Kind of further researches (theoretical, experimental, design, consulting, other) 2. Achieved results of further researches 3. Publications 4. Conferences/seminars reports 5. Practical implementation (projects, consulting, designing) 6. Theses (Ph. D., M. Sc., etc.) and/or scientific advising and supervising
Recommendations	Awardee's opinion on IPA Scientific Grant Awards

Our questionnaire was shared with almost all awardees (Principal Investigators) of IPA Scientific Grant Awards whom we could reach due to available contact information. We got 11 responses covering the whole period of grant awards application (2007-2014). Reactions were received from Japan (8), China (1), Vietnam (1) and Ukraine (1).

Summarizing aims, subjects, results of all made researches (in general) and gained commentaries from IPA awardees (in particular) it is possible to conclude the following.

1. Fulfilled researches covered such topics as:
    - Press-in technology, pilers and related machines
    - Piles and their features (mainly tubulars and sheet piles): stress-strain state, bearing capacity, etc.
    - On-site investigations, ground properties and soil behavior
    - Experimental and numerical studies of pressed-in structures including influence on neighboring buildings
    - Case studies and environmental issues, projects and designs
2. Research teams mainly consisted of Principle Investigator and younger colleagues (PhD students, MS students, etc.)
3. Methods of research were rather diverse, but mainly experimental studies had been applied: physical modelling in laboratory conditions, large scale on-site tests or numerical modelling (FEM was applied as main instrument which effectiveness depends on correct selection of the "structure-soil interaction" model). Most important results were obtained due to combined application of experimental data and advanced theoretical models; in particular it relates to such actual problems as sheet piling behavior and tubular piles bearing capacity
4. Process of reporting on obtained results was coincided with regular IPA workshops. Considerations on each research were not formal procedure but free professional discussions leading to the better understanding of the subject of disputes.
5. Importance of achieved results and conclusions have been confirmed by their publications not only in the Proceedings of workshop but also in the well-known scientific journals with high impact factor and in the proceedings of prestigious international conferences, etc.
6. According to the gotten awardees' responses, a lot of obtained results (about 75%) occurred to be rather perspective for their further development. In most cases researches were continued after awarded period either in the form of further experimental and numerical studies or by the way of summarizing achieved scientific information resulting in reports to the international conferences, articles in the journals. Also, due to IPA Grant Awards several Ph.D. and MS theses were developed and defended (at least 6 theses were reported). It is worth to mention that many awarded principal investigators have applied information related to the Press-in method in the educational process in their universities.
7. According to the opinions of principal investigators, awarded grants gave them and their colleagues new interesting possibilities, in particular:
    - to up-date experimental facilities and instrumentation and, correspondingly, to get new research results,
    - to use the grant as the incubator to expand the scope of engineering since the topics were rather cross-disciplinary issues,
    - to have the opportunity to participate in international conferences and workshops with students, present research results, visit sites (where press-in engineering and press-in machines are applied) and conduct language training, which led to an increase in their motivation for research,
    - to update the analysis software (for example, for the three-dimensional FEM and for liquefaction analysis),
    - to set the research theme in the graduation research of the students of the main course and the special research of the students of the advanced course.
8. In order to support prospected researches, IPA initiated creation of specialized technical committees which have some resources to provide their fruitful activity (see related articles (P10-P22) in this Newsletter issue)
9. Finally, it is possible to conclude that IPA Grand Award initiative had played an important role to select topical directions of Press-in related researches, to check perspectivity of the proposed scientific approaches and to provide further development of the most promising ideas. So, why not to consider some form of restoration in coming future of such memorable and useful event as IPA Grand Award? Obviously, its organization and arrangement may be modified regarding current situation. In particularly, from the point of view of regularity, this event may be correlated with International Conferences on Press-in Engineering.

It is my pleasure to express gratitude to Dr. Osamu Kusakabe (IPA Executive Director) and Ms. Hongjuan He (IPA Secretariat) for kind support, useful advice and interesting information during preparation of this material.

Science, Engineering and Press-in Piling – the Headwaters of the IPA

Dame Sarah Springman FREng

Formerly Professor of Geotechnical Engineering and Rector of ETH Zurich
Principal, St Hilda's College, the University of Oxford

There are many examples of practical expediency leading to the creation and evolution of new technologies in ground engineering that are more effective and efficient, and hence these become more economic, too. When environmental sustainability is added to the equation, then it is quite likely that a winning formula has been found and should be commercialised and shared around the world. This is why the International Press-in Association was formed 15 years ago, to promote the understanding and use of this mode of pile and piled wall installation. The IPA seeks to bring experts from geotechnical, environmental, mechanical and electrical engineering together to explore and explain unseen phenomena and mechanisms in the ground.

This short retrospective recounts the early days of the relationship between the Soil Mechanics Group from the University of Cambridge and GIKEN LTD., dating back a further 15 years.

Pragmatic geotechnical engineering in terms of 'Just doing it' led Mr. Kitamura to evolve the Silent Piler technology, to improve the installation and performance of piles and sheet pile walls, environmentally and economically. Initially, this was for the Japanese market, and later for the Asian market and thereafter, further afield. His style of conceiving and thinking through what he wanted to achieve, and how he delivered it, was deeply impressive: from the perspective of mechanical, electrical and process engineering, through to the kit of parts from the smallest bolt to the biggest item, and how they should be manufactured, instrumented and fitted together.

Since the science behind the mobilisation of pile and piled wall resistance during and post silent-driving was in its relative infancy, in terms of identifying and quantifying the interacting mechanisms, Mr. Kitamura and his colleagues at GIKEN LTD. in Kochi, Japan, approached the Soil Mechanics Group at the University of Cambridge. Professor Malcolm Bolton and the author visited Kochi in December 1993 to explore future possible relationships (see pictures below).

Subsequent negotiations following the visit led to annual selections of Masters' students from Cambridge, who would visit GIKEN / GIKEN subsidiaries / GIKEN projects and engage in research for their Masters' projects, arising from their observations in the field. The first two students were Ms. Fiona Gooch and Mr. Matthew Carter, who visited GIKEN in summer 1994 and identified the following issues to be of relevance and interest to them:

1. Strength mobilised in the pressure bulb with time during driving, surging and in service.
2. Predicting the maximum press-in force and productivity rate.
3. Calibrating penetrometer (CPTu/SPT) data with data obtained during silent-piling to assist with point 2.
4. How to apply water jetting most effectively to ease driving and in view of environmental considerations.
5. Opportunities to develop air jetting to improve driving in some soils.
6. Determining lateral stresses acting on the sheet pile walls over time.
7. Comparisons of press-in methods with pile driving methods.
8. Developing an effective reaction base from past/recently driven piles.
9. Influence of silent-piling on novel prefabricated structures.

Their reports and theses were submitted as the first of a series of Cambridge students, who have benefited from this relationship early in their careers. Dr. Stuart Haigh remains active in this field today, nearly 30 years on from the initial meetings in Kochi. Personally, may I wish the IPA all the very best, and much success in the future!

Fig. 1. Mr. Kitamura (left) in his office with members of his team (2nd left and right), getting to know the Sensei, Professor Malcolm Bolton and his colleague, Dr. Sarah Springman!

Fig. 2. Sensei Bolton in action, discussing the Press-in installation mechanisms.

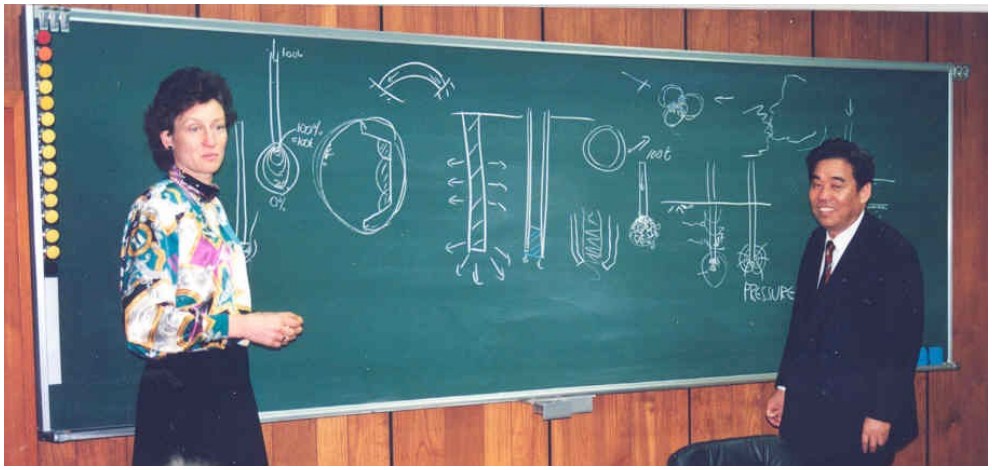


Fig. 3. Mr. Kitamura advising the author

Fig. 4. The author obtaining practical experience in driving the SILENT PILER.

Fig. 5. Powering the SILENT PILER: a triathlete in action

Fig. 6. Mr. Kitamura (centre) with Professor Malcolm Bolton (left) and Dr Sarah Springman (right) in front of one of the earlier silent-piling rigs.

Fig. 7. With the support team (Mr. Stephen Hodge)

Fig. 8. At Katsurahama Beach

Fig. 9. In Lilliputian style below Ryoma Sakamoto

IPA NewsLetter Volume 7, Issue 1 February 2022

Remembering early press-in research – the Headwaters of the IPA

David White

Professor, University of Southampton

Introduction

It is a pleasure to reflect back on the early years of press-in research for this special 15th Anniversary issue of the IPA Newsletter. During my third year as an undergraduate student, a scholarship was advertised offering a bursary and the opportunity to visit Japan during the summer vacation period to carry out fieldwork. I applied and was interviewed by Professor Malcolm Bolton. A few days later I heard I had been successful and was told to get organized to visit Kochi during the summer, as one of three Giken Scholars. This began my 10 years of involvement in annual summer visits to Japan by Cambridge students, to participate in press-in engineering research at the Giken test sites in Kochi, on Shikoku Island. These visits combined cultural exchange and targeted research. Every year, the group of students would assemble at Heathrow, accompanied by Malcolm, and board a flight to Kansai. For the new scholars this was usually their first visit to Japan, and in some cases a first trip outside Europe.

Giken Scholarships: collaborative research and cultural exchange

We were always given a remarkable welcome on arrival at Kochi's small airport. Mr. Akio Kitamura, Founder and Executive Chairman of GIKEN LTD., would usually be waiting in the driving seat of his restored vintage bus, ready to drive us to our hotel in downtown Kochi.

The Giken Scholarships were the core element of a collaboration between Giken Seisakusho and the University of Cambridge that originated when Mr. Kitamura contacted the university around 1993. These early interactions with Malcolm Bolton and Sarah Springman (who was a lecturer in Cambridge at the time) led to a first visit by Cambridge students to Kochi in Summer 1994.

The resulting collaboration began as a very loose arrangement, unburdened by work packages or specific deliverables. Instead, the aim was to bring bright and enthusiastic Cambridge students to Kochi to immerse themselves in the philosophy of the company, and to collaborate on topics of mutual interest. Since Giken is primarily a mechanical engineering firm, and the Cambridge cohort were focused on geotechnics, there was plenty to learn from each other as we explored the possibilities of Giken's press-in technology.

Fig. 1. The Cambridge team pressing-in piles: Gulin Yetginer, Malcolm Bolton and David White take turns to operate a Silent Piler under the watchful eye of Kayoko Yamamoto at Giken's Takasu facility in July 2001.

Visits would often begin with a tour of the Takasu site, including Mr. Kitamura's personal museum of pile driving equipment. We would also enjoy demonstrations of new types of piling machinery, and there would be a chance to try press-in for ourselves, using a wirelessly-controlled Silent Piler (Fig. 1). We would then spend long sessions at the whiteboard, sketching soil mechanics concepts, pondering the mechanisms of pile capacity and installation resistance, and exploring the possibilities offered by the remarkable robotic control and actuation systems offered by the

Giken technology. These sessions tested the endurance of the English-speaking Giken staff who acted as translators, but were often followed by memorable staff parties with raucous speeches and endless toasting.

The visits soon established a pattern in which a series of pile installations and load tests would be planned, and the test program would keep the Cambridge team occupied for the month of their visit. These tests were primarily conducted at Giken's Takasu facility, under the stewardship of Teruo Nagayama's team (Fig. 2), with occasionally visits elsewhere, to find different ground conditions.

Fig. 2. Giken Scholars working alongside Giken engineers at the Takasu test site
(clockwise from top left: 1997, 2002; 2006; 2002; 2003)

The Cambridge team worked alongside the Japanese engineers on all aspects of the testing. We learned both the practical skills – site safety, machine operation, instrumentation use – and also the Japanese cultural approach to work. This included the morning exercises, the daily environment clean-up (kankyo seibi) and adopting a 'first time success spirit' (ippatsu seikou seishin). I still enjoy using these phrases today. Figure 3 shows the Giken scholars from the first decade of the scheme.

Early research achievements

On returning to Cambridge, the Giken Scholars would extend the summer's work during their final year project. This collaboration format was very productive, leading to outcomes that the Giken Scholars were able to publish in conference papers co-authored with Giken company colleagues. These papers include:

- Measurement of the stresses in pile plugs, using novel instrumented bolts (White et al. 2000)
- Installations with and without pile shoes, to minimize resistance (Finlay et al. 2001)
- Field data confirming the low noise and ground vibration from press-in piling (Rockhill et al. 2003)
- Load tests and interpretation to assess the high stiffness of pressed-in piles (Deeks et al. 2005)

- Load tests quantifying the capacity of pressed-in cell foundations (Yetginer et al. 2003, 2006)
- H-pile load tests confirming a positive group effect from plugging activation (White et al. 2003)
- Observations of rate effects during installation, linked to consolidation (Jackson et al. 2008)

Fig. 3. The first decade of Cambridge Giken Scholars, 1996-2005 (top row: Matthew Carter, Fiona Gooch, Naomi Lyons, David White; middle row: Peter Kirkham, Hari Sidhu, Tim Finlay, Yueyang Zhao; bottom row: David Rockhill, Andrew Deeks, Gulin Yetginer, Helen Dingle and Melvin Hibberd)

A common thread throughout these studies is the linkage between the special features of press-in construction and the underlying soil mechanics. The insights have led to improved recommendations for the design of pressed-in piles, for example to harness the higher stiffness created by the jacking process, or the activated plug capacity from a pressed-in H-pile wall. The research has also led to new ideas for the design and operation of press-in machinery. For example, Andrew Deeks' PhD demonstrated the easier installation that can be achieved by combining press-in with rotation – a technology used by the Gyropress system. Other work led to improvements to the water jetting systems used to ease high jacking forces.

The papers authored by Giken Scholars on their press-in research have now been cited >250 times, and the early work was consolidated into two invited keynote papers (White & Deeks 2007, White et al. 2010). A full list of the early Cambridge-Giken projects was presented in Volume 2 Issue 2 of the IPA Newsletter.

The research outcomes from the visits to Japan are only part of the impact of Mr. Kitamura's support for the Giken Scholarship scheme in Cambridge. The positive experience in Japan was a memorable cultural experience (Figure 4) as well as providing engineering training. It has led many of the Giken Scholars into a successful civil engineering career. Giken Scholars can currently be found working at Arup (multiple!), BP, Beale & Co, Buro Happold, Equinor, Laing O'Rourke, McKinsey, the Norwegian Geotechnical Institute, Ramboll, Skanska and Twinza Oil. Some have pursued different but

equally successful careers, with activities ranging from fair trade policy development to hedge fund management.

Fig. 4. Cultural experiences (clockwise from top left): a fast-flowing noodle flume (2004), a Tea Ceremony (2001), an izakaya in Kochi City (2006) and a Giken party hosted by Mr. Kitamura (2003)

Press-in engineering: visionary foresight

It is remarkable to look back 25 years to the first Cambridge visits, and see the foresight of President Kitamura and the Giken Seisakusho organization. At that time, Giken's machinery was pioneering concepts of robotics, automation and digitalization that are only now emerging into the engineering mainstream. Giken was investing in these technologies more than forty years ago, which led to the first wirelessly-controlled Silent Piler in May 1982 and the first cloud-connected Silent Piler in 2003.

In 2004 the Cambridge team were shown a demonstration of the Giken-IT system which monitors the machine performance and jacking resistance of each a Silent Piler and beams this data back to a control centre in Kochi. This system allowed the Giken engineers to monitor the performance of each machine, and plan predictive maintenance. The measured press-in force also fed into a database of ground-related information, allowing installation rates and operating practices to be predicted and optimized for different ground conditions. In establishing this early form of 'digital twin', Giken realized the value of 'big data' to improve the performance of their machines and assure the performance of the structures they create.

In 2004 we were given a presentation on the Ecopiler, which was then entering production – a Silent Piler that operates on biodegradable lubricants to reduce the environmental impact of construction. Earlier, in 2002, Giken supported a project by Sarah Carley in Cambridge that completed a life cycle analysis to quantify the embedded carbon in different

types of retaining wall. This analysis compared steel and concrete solutions, and accounted for the additional impact from temporary works, which are largely eliminated by the press-in method.

During our visits we were sometimes taken to a demonstration of the Ecocycle facility – an underground circular wall of pressed-in piles, in which a carousel system is installed, to park bicycles. This system could rapidly store and retrieve bicycles using swipecard control, providing a method to add bicycle parking at Japan's crowded public transport interchanges, reducing car use.

Today, with decarbonization and the preservation of biodiversity at the top of the global agenda, and with data science driving advances in many sectors, all industries are heading in the direction that Giken turned towards more than 20 years ago.

Genesis of the International Press-in Association

By 2005, the Giken-Cambridge collaboration had gained a high profile among the geotechnical engineering community, and Mr. Kitamura was looking to raise the profile of press-in engineering further by supporting a wider range of researchers, and establishing an organization that could coordinate and champion this effort.

Initial planning for the International Press-in Association included a preparatory assembly of the IPA in Kochi, Japan, hosted by Hajime Okamura of the Kochi Institute of Technology. This initial IPA event was held one week before the quadrennial International Conference on Soil Mechanics and Geotechnical Engineering took place in Osaka. As a result, Giken were able to host a large group of international geotechnical experts at the Kochi facilities (Fig. 5). The preparatory assembly included demonstrations of press-in technology and presentations of the research work to date. This event was successful in creating wider engagement with the global research community. The seed of the IPA was sown, and over the next year a working group began to develop a framework for the IPA that brought together Japanese and international academia, as well as local and international industry.

Fig. 5. International experts gathered in Kochi for the preparatory assembly of the IPA in 2005. They are seen here in the Monumental Garden of the first Press-in Piling, at Giken's Takasu site, 9 September 2005.

By the end of 2006, arrangements to create the IPA were in place, and the organization was formally established on 16 February 2007, headquartered in Tokyo. A first international workshop of the IPA took place in Cambridge during September 2007, and was attended by 32 participants (Figure 6). The event included state-of-the-art presentations on press-in research and practice, and a ceremony for the award of US$100,000 of new funding to a wide range of other universities. The event closed with a ceremonial dinner at St John's College, Cambridge, exchanges of gifts, and toasts to the success of the IPA.

And so, the IPA was born, with a mission to explore, enhance and promote press-in engineering. Today Giken and the IPA maintain their strong link to Cambridge. Dr Stuart Haigh now leads the collaboration, and the Giken Scholars continue to work alongside the Giken engineering team to explore the potential of press-in engineering. Meanwhile, the IPA has become a well-established organization, with more than 800 members sharing the same excitement for press-in

engineering as the Giken Scholars, contributing research and good practice across the breadth of press-in engineering themes.

Fig. 6. A photo montage of the first International Press-in Association Assembly, Cambridge, Sept. 2007

References

Deeks A.D., White D.J. & Bolton M.D. 2005. The comparative performance of jacked, driven and bored piles in sand. Proc. XVIth Int. Conf. Soil Mech. & Geotech. Engng., Osaka. 3:2103-2106

Finlay T.C.R., White D.J., Bolton M.D. & Nagayama T. 2001. Press-in piling: The installation of instrumented steel tubular piles with and without driving shoes. Proc. 5th Int. Conf. Deep Fndn. Practice, Singapore. 199-2

Jackson A.M., White D.J., Bolton M.D. & Nagayama T. 2008. Pore pressure effects in sand and silt during pile jacking. Proceedings, 2nd BGA International Conference on Foundations (ICOF 2008), Dundee, U.K., IHS BRE Press, Watford.

Rockhill D.J., Bolton M.D. & White D.J. 2003. Ground-borne vibrations due to press-in piling operations. Proc. BGA International Conference on Foundations, Dundee 743-756

White D.J. & Deeks A.D. 2007. Recent research into the behaviour of jacked foundation piles. Proc. International Workshop on Recent Advances in Deep Foundations, Yokosuka, Japan. eds. Kikuchi, Kimura, Otani & Morikawa. Taylor & Francis 3-26.

White D.J., Deeks A.D. & Ishihara Y. 2010. Novel piling: axial and rotary jacking. Proc. 11th Int. Conf. of the Deep Foundations Institute, Geotechnical Challenges for Urban Regeneration. London.

White D.J., Bolton M.D. & Wako C. 2003. A novel urban foundation system using pressed-in H-piles. Proc. XIIIth Eur. Conf. Soil Mech. & Geotech. Engineering, Prague 2:425-432

White D.J., Sidhu H.K., Finlay T.C.R, Bolton M.D., Nagayama T. 2000. Press-in piling: The influence of plugging on driveability. Proc. 8th Int. Conf. Deep Foundations Inst., New York. 299-310

Yetginer A.G., White D.J. & Bolton M.D. 2003. Press-in piling: field testing of cell foundations. Proc. BGA International Conference on Foundations, Dundee 963-974

Yetginer A.G., White D.J. & Bolton M.D. 2006. Field measurements of the stiffness of jacked piles and pile groups. Géotechnique 56(5): 349-354

Chapter 3

The Future Vision of Press-in Piling

IPA NewsLetter Volume 7, Issue 1 February 2022

The Future of Press-in Technology

Tsunenobu Nozaki

Manager, GIKEN LTD.

Osamu Kusakabe

Executive Director, IPA

1. Introduction

IPA has been an organization, aiming to deal with multidisciplinary subjects related to press-in technology from mechanical engineering to geotechnical engineering. Under the title of Future of Press-in Technology, the article describes three aspects, future trend of mechanical development, further potential application areas and possible research subjects. Social needs such as action to climate change will trigger mechanical development, and the mechanical development will be accelerated from the development in peripheral technologies, such as ICT and AI technology. Research subjects in geotechnical aspects will emerge when press-in machines with innovative functions becomes available. It is, therefore, obvious that these three aspects are closely interrelated. The article is the authors' view of future trends of press-in technology, not necessarily reflecting the opinion or plan of a particular manufacturer of press-in machinery.

2. Future trend of mechanical development

Press-in piling machinery and equipment have evolved and diversified to meet a wide variety of construction and geo-structures. We expect the applicable areas of the press-in piling method to expand further and further, and at the same time, it will be more emphasized to focus on sustainability and environmental performance. The mainstay of the future sophistication of press-in piling machinery will mainly be digitization, full automation, weight saving and decarbonization.

2.1 Digitization

Digital transformation is widely applied from the design stage to the operational process of press-in piling machinery. A vast number of analogue activities have been replaced by digital technology. The digitization not only improves efficiency of press-in piling machinery, but also creates new added values. Operational and geotechnical information obtained through pile installation can be compiled into a database. This database can then be used for 3D method statements and as-built drawings, optimizing structural design and quality assurance of geo-structures. In addition, digitization creates room for the press-in piling method to implement AI in the future.

2.2 Full Automation

Press-in piling machines with automatic repeated upward and downward motions of pile installation, first appeared decades ago. It is expected that the automated press-in operation will eventually achieve full automation. In addition to pile installation and extraction motions, the self-walking function was recently automated. In order to further automation, cutting-edge sensing technologies, IT and multivariate analysis technologies are being applied to the press-in piling system for the future. With the fully automated press-in piling system, machinery will autonomously synchronize and operate based on the obtained construction data during piling operations.

2.3 Weight Reduction

The most recent press-in piling machine does not completely rely on press-in force to generate the required pile penetration force. In press-in piling principles, the high press-in speed enables press-in piling machines to install piles with a smaller press-in force, resulting in lighter machines. This trend will evolve further and the applicable areas for the press-in piling method will increase, with lighter machines.

2.4 Decarbonization

The climate crisis is reshaping our world, causing economic and political instability. Therefore, regardless of the type of industry, decarbonization is an imminent global issue in the reduction of greenhouse gases. This movement will take root in the construction industry to achieve substantial emission reduction.

Regarding press-in piling machinery, some models have already been electrified and can operate if there are external electric power supplies. In order to achieve zero CO_2 emission in construction, it is essential that a renewable energy supply chain is made widely available. The development of carbon-free products, such as green hydrogen and ammonia, will provide more options of shifting to zero emission if power units operating on these carbon-free products become more available at lower costs. On the other hand, we have to look at decarbonization in the steel manufacturing industry. As the majority of applicable piles for the press-in piling method are steel piles, this issue is deeply related to the press-in piling industry. In the future, if steel piles are made of green steel which is made by utilizing renewable energy, we could call that a real decarbonization of the press-in piling industry.

3. Further application areas of press-in technology

The press-in piling method was invented to eliminate noise and vibration problems on construction sites, which were controversial social problems at the time. In addition to the environmental friendliness aspect of the press-in piling method, it is well utilized to overcome restricted working conditions, such as confined working spaces, slopes and above water. Since developing the driving assistance method to overcome hard ground, and expanding its capability to facilitate larger piles, the press-in piling method is nowadays utilized in extremely soft ground and hard ground, and from shallow to deep foundations, regardless of noise and vibration issues.

As mentioned in “Future trend of mechanical development” above, the press-in piling method will be even more cutting-edge in the future. At the same time, it will be utilized in new situations.

Basically, the press-in piling method is one of the most labor-saving piling methods. However, if press-in piling machinery becomes fully automated, there will be many more situations in which the method will be applicable. With less need for on-site personnel at disaster hit areas or contaminated sites, there will be less risk of harm to personnel. Also, we will be able to facilitate larger pile dimensions due to the advancement of press-in piling machinery. As a result, much larger and deeper foundations will be able to be installed by the press-in piling method in the future.

At the same time, the press-in piling method will diversify to meet expectations of a demand for more sophisticated foundations in the future. Until now, the press-in piling method has exclusively been utilizing prefabricated piles available in the market. Therefore, the performance of the foundation structures is determined only by pile profiles and ground conditions. As such, post-installation methods which increase the performance of the pressed-in piles will be developed. These could include methods such as stabilizing the foundations with pressure grouting and pile cladding for longer service life etc. These kinds of innovations might be delivered from outside of the construction industry, e.g. the chemical industry.

In some countries, the use of steel piles is avoided despite the fact that they are commonly utilized in many others. A typical example is the utilization of steel piles within riverbanks and/or as perimeter basement walls of buildings, in a particular country is not acceptable. In such exceptional cases, the onus is upon us to explain the basic uses and advantages of the press-in piling method and steel piles, to people in the construction industry.

Although the basic principle of the press-in piling method “Installation new piles by deriving its reaction force from previously installed piles” is very simple, it also has potentiality to open completely new areas for its use. The press-in piling method is an unparalleled piling method in terms of gravity usage. The principle of the press-in piling method would be effective even in a weightless environment and is expected to be realized in space development. In terms of gravity environment, we should be able to utilize the same piling machinery and piles. In the future, it is expected that the press-in piling method will be unified to be more universal for construction works on our planet. Then, the unified press-in

piling technology can be consolidated and related to different gravity environments.

4. Future research subjects

As was pointed out at the beginning, new mechanical developments and new application areas will add various research subjects, in addition to remaining research subjects related to existing press-in technologies. Due to the page limitation, the followings are selected possible future research subjects mainly from geotechnical viewpoints.

4.1 Noise and vibration for rotary press-in piling.

One of the key features of press-in piling is environmental friendliness. Field monitoring data confirmed that the noise and ground vibration caused by the press-in piling is much smaller than those by other piling methods. These data were mainly obtained from standard press-in piling with earlier press-in machines. Not much monitoring data of noise and ground vibration are available for rotary press-in piling. Particularly, accumulated data of noise and ground vibration are needed for rotary press-in cutting into an existing reinforced concrete wall or penetrating though an embedded obstacle.

4.2 Performance of installed pile with driving assistance.

At the early stage of research works by the Cambridge- Giken research collaboration, field and laboratory tests were conducted on the performance of pile installed by standard press-in piling from various aspects such as bearing capacity of installed pile (see Newsletter, Vol.2, No.2, Vol.3, No.1 and Vol.3, No.3). Comprehensive research effort is however limited to advance our understanding of the mechanism of installing process as well as performance of installed pile by press-in pling with driving assistance, such as press-in piling with water jetting, press-in piling with augering.

4.3 Interpretation of selection diagram of pressing technique

The press-in retaining structures, a handbook gives conceptual diagrams for the selection of press-in technique for sheet pile and for tubular pile, separately, in a form of two-dimensional diagram of penetration depth versus SPT N value. Using these diagrams a practical engineer may select an appropriate press-in technology suitable for a designed pile length for a given soil profile, among standard press-in, assisted with water jetting, assisted with augering and rotary press in. These diagrams are created based on field experiences and there exists no proper interpretation of these diagrams from geotechnical engineering viewpoints. The research may help to extend these diagrams for taking multi-layer ground profiles into consideration.

4.4 Effective use of water pipe for lubrication in rotary press-in for grouting

Rotary press-in machine is equipped with a water lubrication system, enabling discharging water at pile toe. If this system could be used for grouting purposes at pile toe after installation processes, an enlarged base could be formed at pile toe, increasing vertical stiffness and bearing capacity of installed piles, and possibly leading to shorten designed pile length. When a solid bearing layer exists at a deeper depth, this system may become effective. It may be worthwhile exploring the possibility and feasibility of this idea.

4.5 Estimate of abrasion of cutting bits

Rotary press-in piling is often used to install tubular piles with cutting bits at pile toe into hard ground. In contrast to shield tunneling where abraded cutting bits can be replaced when necessarily but replacing cutting bits of tubular pile for foundation pile of retaining wall are practically impossible. The estimate must be made prior to execution of piling. Thus, the development of method for estimating the deterioration of cutting bits for a given ground condition is of practical importance. The estimate is also used for evaluation of rate of penetration and time required for hard layer.

4.6 Estimation of pile installation time into rock, and drilling tool usage calculated by Rock Abrasivity Index (RAI)

Rock drilling efficiency into rock can be estimated according to the Rock Abrasivity Index (RAI). RAI can be calculated based on the Unconfined Compressive Strength (UCS) of rock. However, at the geotechnical investigation stage of construction, normally there are few unconfined compressive tests carried out. Therefore, if the rock is much harder than expected, there will probably be a delay in the piling schedule, an excess over the estimates of drilling tool consumables and uncertainties about the stability of the installed piles. In order to overcome this, it is advantageous to estimate and

record the UCS throughout rock drilling, based on the drilling data. Remaining drilling time and drilling tool consumption can be estimated in real time, by correlating the type of drilling tool, the weight on the drilling tool, rotational torque drilling speed and UCS previously acquired. The drilling record can also be used for assessing stability of installed piles.

5. Concluding remarks

To conclude this article a few remarks related to press-in industry may be appropriate. Any industry must comply with sustainable development. The construction industry including the press-in industry, requires 3Rs; reduction of deterioration and damage effects, reuse of construction elements and recycling of building materials. The two main factors of the press-in industry are the machine manufacturer and the piling contractor. Some main questions that may arise to manufacturer in the near future are: By what way the diversification of press-in pile manufacturers may go?, What may be an optimal approach to machine maintenance?, and when we may expect fully automated operation of press-in piling machines? Obvious expectations connected with piling contractor's activity are sharing data and experiences, creation and utilization of big data and formation of local/regional industrial organizations, for example.

Some aspects of further development of the press-in technology other than the issues described earlier include (1) To increase the range of pile's profiles and sections available for installation by Press-in Method to cover existing demands of large potential markets, (2) "Skip of Piles Method" may have a wider application, and (3) Training centers for piler's operators and demonstration/display centers for customers may be of high demand.

IPA NewsLetter Volume 7, Issue 1 February 2022

Future Prospects of Press-in Piling in Vietnam

Dr. Vu Anh Tuan

Science and Technology Office
Geotechnical Engineering Laboratory
Le Quy Don Technical University, Hanoi, Vietnam

1. Current situation in Vietnam

Vietnam is situated in the East of Indochina peninsula, with a total land area of 329,241 km^2, a land border of 3,730 km and a coastline of 3,260 km. The topography and geology are very diverse, including three main types of terrain: hills, mountains, and plains. Vietnam, with its complex terrain consisting of mainly hilly and a long coastline, is often affected by many types of natural disasters from flash floods, landslides, floods, typhoons, sea-level rise, and other impacts from the sea.

There are about 5 - 6 typhoons and 2-3 tropical depressions affecting Vietnam every year on average. Hurricane season starts in June and ends in late November and the first half of December. Typhoons are most concentrated in August, September, and October. According to statistics over the past 40 years, there were 363 typhoons in the East Sea, of which 143 typhoons made landfall (accounting for 39%); On average, there are 9 - 10 typhoons and 4 tropical depressions happening in the East Sea every year, of which 4-5 typhoons and 1-2 tropical depressions directly affect the mainland. The number of storms in the East Sea in recent years tends to increase both in number and intensity, for example, 14 typhoons and 5 tropical depressions in 2013, 16 typhoons and 4 tropical depressions in 2017 [1].

Due to heavy rains, flash floods and landslides often occur in mountainous areas, where there are steep slopes and weak soils. According to the survey results of the Institute of Geosciences and Minerals, there are over 10,000 sites with high risk of landslides in mountainous areas. Flash floods and landslides often arise suddenly, occur in a narrow but very severe range, and often cause serious loss of life and property. According to statistics in the last 20 years, there have been over 300 serious flash floods and landslides. This type of natural disaster occurs frequently in mountainous provinces causing serious loss of life and property, but in recent years, there has been a considerable increase in the trend. In the last 10 years (2010 - 2019), the number of flash floods and landslides has increased by nearly 1.5 times (from 123 to 123) in comparison with previous 10 years (2000 - 2009), in which in particular:

- The flash flood on 2000 October 3rd in Lai Chau caused 39 deaths; the flash flood on 2002 September 20th in Ha Tinh caused 53 deaths; the flash flood on 2005 September 28th in Yen Bai, killed 50 people.

- The flash flood on 2016 September 14th in Nghe An caused 12 deaths; flash floods on 2017 August 3rd in Son La and Yen Bai killed 36 people; Landslide on 2017 October 13th in Hoa Binh killed 34 people.

- In 2018, there were 18 severe flash floods and landslides on a large scale in the northern and central mountainous provinces: serious flash floods occurred in Lai Chau province in June 2018, Thanh Hoa province in August 2018, and Khanh Hoa province in November 2018. Flash floods and landslides have left 82 people dead and missing (accounting for 37% of the total loss of life across the country).

- In 2019, flash floods and landslides after the August 3rd storm in the mountainous provinces of the North and North Central region made 22 people dead and missing. The most serious was in Quan Son district, Thanh Hoa province left 16 people dead and missing.

- In the first 10 months of 2020, there were 7 terrible landslides that made over 100 people dead and missing, including many officers and soldiers of the armed forces, especially landslides in the Rao Trang 3 hydropower plant (Fig. 1), sub-zone 67, Huong Tra district (Hue province), Huong Hoa district (Quang Tri province); Tra Leng and Tra Van communes in Nam Tra My district (Quang Nam province).

Fig. 1. Landslide in Rao Trang 3 hydropower plant in October 2000

Fig. 2. Riverbank erosion in Dong Thap province of Mekong River Delta

Along with flash floods and landslides, riverbank and coastal erosions have occurred quite frequently throughout the country with an increasing tendency in both frequency, scope, and level of danger, seriously affecting the property of the country and the residents, affecting the people's life and production in the disaster-affected area.

According to reports from provinces/cities, there are 2,358 eroded riverbank and coastline sites in the country with a total length of over 3,133 km. In which, there are 206 points of special landslide (landslide directly endangers the safety of dikes, residential areas and important infrastructure) with a total length of 427 km; especially in the provinces of the Mekong River Delta with 104 extremely dangerous landslides with a total length of 293 km (Fig. 2), seriously threatening the lives and properties of the country and people, and causing the loss of about 300 hectares of land per year.

Coastal erosion is a common phenomenon in coastal areas in all three regions of Vietnam, with 397 sections with a total length of over 920 km, of which erosion occurs in 233 sections with a total length of up to 492 km. Particularly, the coastal strip from Quang Nam to Phu Yen has 65 areas, including 105 sections that are eroded. According to the investigation and calculation results of a group of scientists from the Institute of Geography and Quy Nhon University, the coast of Quang Nam province has 20 erosion sections of nearly 19 km (see Fig. 3); Quang Ngai province has 27 sections of over 35 km; Binh Dinh has 33 sections of nearly 34 km, and Phu Yen province has 25 areas with nearly 21 km of erosion.

Fig. 3. Coastal erosion in Quang Nam province

Apart from the effect of natural disasters, Vietnam has been subjected to quite serious problems originated from population explosion and degraded transportation infrastructure. In recent years, the lack of parking areas has become an urgent problem in big cities such as Hanoi and Ho Chi Minh city. According to the Hanoi Department of Transport, there are about 6.9 million vehicles (cars and motorbikes) in the capital city excluding the number of foreign vehicles. As for estimation, with the growth rate of motorcycles 7.66%/year; automobiles 16.15%/year, Hanoi, by 2025, will have about 1.3 million cars and 7.3 million motorbikes; and about 1.7 million cars and 7.7 million motorbikes by 2030 [2]. However, the current static traffic system (public parking spots) is not adaptable (see Figs 4 and 5). Meanwhile, to solve this situation, according to experts in the field of traffic, the government, for a long time, was only interested in situational solutions such as using roadbeds, sidewalks, under-bridge areas, etc. ... for parking but the solutions are not so effective. Currently, the construction of underground or elevated car parks is an inevitable trend of big cities in the world and is suitable with the current conditions of Vietnam.

Fig. 4. Lack of car parking area

Fig. 5. Lack of motorbike parking area

The network of local roads in Vietnam has more than 450,000 km of a total of more than 570,000 km of the national road network (equivalent to 88%), including more than 4300 bridges [3]. Lack of this network and low-quality roads and bridges in rural areas are among the reasons for poverty in Vietnam. Such situation has reduced the ability to access social services, especially welfare services (healthcare, education ...), increased transportation costs, limited production transactions. To achieve the goal of poverty reduction and rural modernization, the government has focused on building and maintaining the local transportation system through programs and projects, especially reinforcing thousands of the degraded bridges (Fig. 6).

Fig. 6. Damaged bridges need reinforcement

2. Prospects of Press-in piling

In Section 1, some of the major problems which Vietnam and perhaps many other developing countries are facing have been presented. The problems could be solved effectively if Press-in piling technology is applied, which has been proved through real projects in the world [4]. Hence, in this section, typical applications of Press-in piling are introduced as effective solutions for overcoming the problems [5].

2.1. Levee reinforcement and beach protection works

Piles are installed into an existing levee for reinforcement as a measure against earthquakes and tsunamis. At the same time, it is possible to raise the height of the levee. As most levees are made of an embankment, the Press-in piling with low vibration has the characteristic of not damaging the levee body. Due to this advantage, such method has been used on coastal levees in Japan since the Great East Japan Earthquake in 2011. It can also be used for beach protection work. When there is erosion and collapse of a structural foundation due to damage caused by typhoons or receding sandy beaches, Press-in piling can be used to construct embedded structures in a short time. If used in construction work over water by employing the non-staging system, which does not require a temporary platform, it can be used to construct a groin for the prevention of coastal erosion.

2.2. Embankment stabilization works, landslide prevention works, disaster recovery

Stabilizing piles or walls can be used to reinforce existing embankments and prevent landslides. Landslide prevention works utilizing steel tubular piles are widely used as measures against landslides. During the Great East Japan Earthquake in 2011, collapses occurred in embankments that were situated in hilly areas. The method can be applied as a measure to prevent the collapse of such embankments.

The scale of landslide prevention works differs depending on the range of the ground prone to landslide and the thickness of the sliding layer. The Press-in piling accommodates the use of a variety of piles, allowing the selection of piles with the necessary cross-sectional performance, such as from steel sheet piles for the reinforcement of small-scale embankments to large-diameter steel tubular piles for full-scale landslide prevention structures. Furthermore, when needing to be embedded into the hard bedrock below the sliding layer, Press-in assisted with augering g or rotary Press-in piling makes this possible. Minimal vibration during installation and a lack of release of in-situ stress allows for safe installation with few factors that induce sliding.

The effectiveness of this method has also been recognized and used in the installation of retaining walls as part of disaster recovery for roads that have already experienced slope failure due to rainfall, where the installation can be carried out without the operator entering danger zones.

2.3. Foundation work (bridges, ports and harbors, buildings)

Sheet pile walls or tubular pile walls installed by the Press-in piling can be used as deep foundations. A steel tubular pile cofferdam foundation is commonly used, where steel tubular piles with interlocks are installed in series.

Foundation pile, however, is not necessarily a contiguous wall but a group of isolated piles as shown in the applications for foundation of earth retaining wall, port facilities and buildings [4, 5]. The recent development of walk-on-pile type piling machine and special attachment enable installation of steel tubular piles with diameter D at center to center spacing of 2.5 D (so-called Skip Lock system).

2.4. Earth retaining structures (earth retaining walls, levees, seawalls, temporary retaining walls, cofferdams, underground car and bicycle parking facilities, etc.)

Earth retaining structure is a structure for ensuring ground stability where there is a difference in the ground elevations behind and in front of the structure. A cantilever wall system that supports earth and water pressures solely by the resistance of surrounding ground at the embedded portion of the wall is used as a retaining structure for various purposes. Among various applications of the embedded wall, the application as earth retaining structures has been the largest area so far and is expected to be used the most also in the future.

- Roads and railways:
For roads, earth retaining walls are often used in the construction of excavated roads and road widening. In general, excavation, backfilling, and (depending on the circumstances) temporary retaining structures are usually needed to construct retaining walls. As the embedded retaining wall allows the use of installed components as the permanent structure, this reduces the scale of construction and is advantageous when there are restrictions on the use of the retained side of the land, such as in urban areas. The compact size of the Press-in piling machine and auxiliary equipment and the ability to use the non-staging system as needed are also of benefit.

Using the Press-in piling for grade separation work of at-grade intersections can reduce complicated diversions of lanes and long-term restrictions on traffic to secure working space for excavation and the installation of retaining walls.

It offers high safety against overturning and swinging as the Press-in piling machine operates by gripping pre-installed piles. It is also used for railways, where there is only a small allowance of displacement and other areas where there is a high requirement for accuracy.

- Ports, harbours and rivers:
Used for levees, seawalls and bulkheads in ports, harbours and rivers. Like in roads construction, the advantage is that earthwork and a temporary cofferdam during installation can be much smaller than those necessary for other construction methods. When construction work over water is involved in the construction of new bulkheads, employing the non-staging system will allow the work to be carried out without the use of temporary platforms or barges if a working space can be secured at the starting point. The Press-in piling can also be used to improve and enhance the capabilities of existing seawalls, bulkheads, and levees, such as by repair work, reinforcements, raising structures, and increasing durability. For example, when maintaining aged bulkheads that have deteriorated, or when enhancing their earthquake resistance, new ones can be constructed in front of or behind the current structures without losing their existing function. When conducting repair work of river bulkheads in urban areas where construction is often carried out in narrow spaces, using rotary press-in piling allows the penetration of existing concrete bulkheads. When there are urban expressways' viaducts above river bulkheads with headroom restrictions during construction, installation can be carried out using machines with low-overhead clearance.

- Buildings:
The earth retaining structures are often used in building projects. They are utilized for the effective use of land as straight walls in areas where buildings are adjacent to each other, as well as in narrow spaces to widen adjacent roads.

- Temporary structures:
The earth retaining structures are often used for temporary purposes such as temporary retaining walls during excavation or temporary cofferdams to provide dry work conditions. In areas with headroom restrictions such as under existing bridges, the Press-in piling is used since there are dedicated machines specially developed for this purpose.

- Underground car and bicycle parking facilities:
Earth retaining structures are also used to build a vertical shaft to accommodate mechanical underground parking lots or underground bicycle stand, utilizing the limited space in urban areas. Underground car and bicycle parking facilities have

been adopted as effective measures to combat the unauthorized parking and abandoned bicycles in the Greater Tokyo Area and other urban central districts. Such facilities employ speedy parking and retrieval systems that contribute to convenience and to reduce congestion.

3. Conclusions

Press-in piling technology has great opportunities not only in Vietnam and many other developing countries but also in developed countries where natural disaster mitigation and environmental protection are attracting the interests of state authorities as well as residents. Press-in piling technology can bring optimum solutions involving engineering technique, economy, environmental friendship, and aesthetics, which traditional construction methods are hardly able to provide.

References

[1] Vietnamese Ministry of Agriculture and Rural Development (2020). Plan of disaster prevention in period 2021-2025 (in Vietnamese).

[2] https://nhandan.vn/baothoinay-dothi/tim-co-che-cho-cac-diem-do-xe-637883/.

[3] X.T. Nguyen and V.H. Hoang (2020). Evaluation the current specifications for bridge in mountainous area of Vietnam, *Journal of Physics: Conference Series*, 1706, doi:10.1088/1742-6596/1706/1/012114.

[4] M.D. Bolton, A. Kitamura, O. Kusakabe and M. Terashi (2020). New horizons in piling – Development and application of Press-in piling. CRC Press/Balkema, Schipholweg 107C, 2316 XC Leiden, The Netherlands.

[5] International Press-in Association (2021). Press-in retaining structures: a handbook.

IPA NewsLetter Volume 7, Issue 1 February 2022

Future Vision of IPA: From Young People

Nor Azizi bin Yusoff

Senior Lecturer, Universiti Tun Hussein Onn Malaysia (UTHM)

Introduction

Since the early establishment of the International Press-in Association 15 years ago, the organization established a worldwide network sharing from an academic interest in the Press-in Technology. Furthermore, the activities may enhance academic and human resource development in this area. In seeing a future vision from the young people's point of view, small group discussions had been initiated.

The Young People Opinion

A simple survey had been conducted on two groups of students at the Universiti Tun Hussein Onn Malaysia (UTHM) and Politeknik Tuanku Sultanah Bahiyah (PTSB). A short briefing of Press-in Technology, IPA and its function were given before the survey. The first group of students is my final year foundation engineering course student. The briefing was given during the class session. The second group of students is students from one of the polytechnics in Malaysia. It was shared during an online seminar session. A total of 92 respondents contributed their views thru the survey.

Fig. 1. The undergraduate student from Universiti Tun Hussein Onn Malaysia (UTHM)

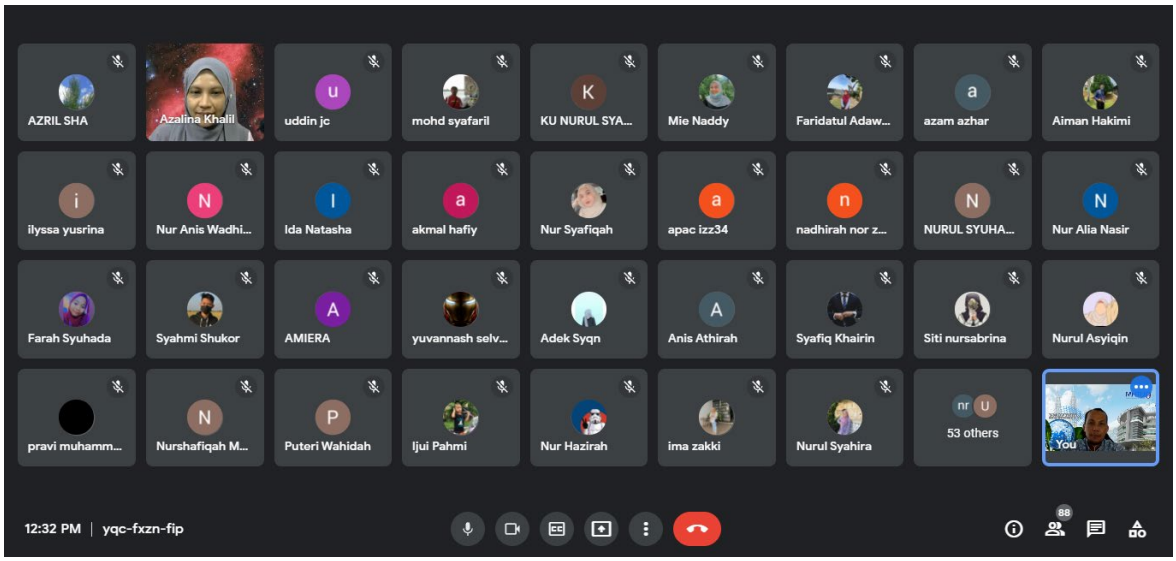


Fig. 2. The diploma student from Politeknik Tuanku Sultanah Bahiyah (PTSB), Malaysia

The aim of this activity is to get feedback among young people in Malaysia about IPA and the Press-in technology. Based on a short briefing and seminar, they will have a brief idea about the organization and the technology. However, it is understandable that they have not experienced the technology in real. Therefore, all views are solely based on their feelings and assumptions. These are some of the selected feedbacks.

QUESTION 1: Do you think IPA may improve your understanding on the Press-in Technology?

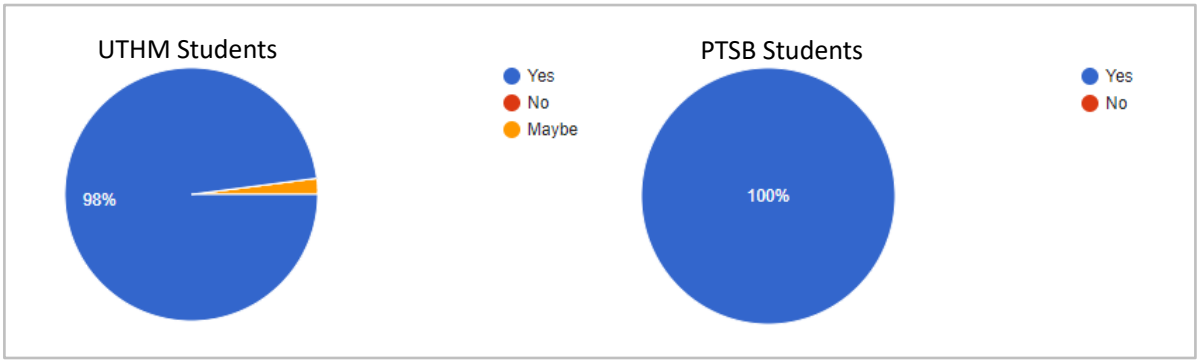


Fig. 3. The results of Question 1

QUESTION 2: In your opinion, what are TWO (2) main advantages of using Press-in Technology?

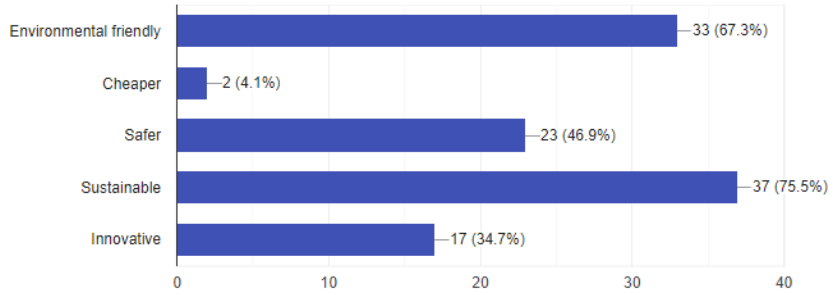


Fig. 4. The results of Question 2 (UTHM students)

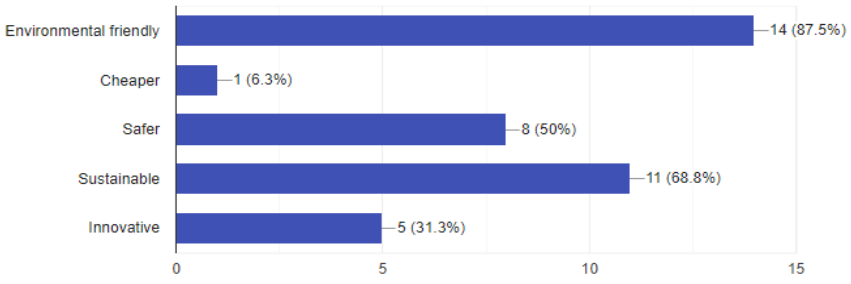


Fig. 5. The results of Question 2 (PTSB students)

The overall response to this question was very positive. The majority of those who responded (98%) to this item felt that the IPA is relevant in improving their understanding of the Press-in technology. For the next question, the respondents were given a chance to choose two main advantages of this technology. Based on the results, both of the groups believed that the technology is great concerning environmental friendliness and sustainability. However, very few of them think that the technology is cheap.

I presume the perspective may be due to the perception that most of the newer technology is commonly more expensive than the other more established ones. In addition, limited local references and publications related to the cost-benefit towards this technology may influence the respondent's view. Therefore, further research activities and analyses will be

recommended in this particular area of interest.

At this point, in a country like Malaysia, the direct cost of the project will be one of the crucial factors to be considered. If more research and future development could be initiated to provide more information to the practitioners, it may enhance the application of this technology. Theoretically, a project adapting press-in technology may result in a cheaper overall project cost due to saving on temporary work. But if only the installation work is to be considered, the cost is potentially more expensive than the ordinary method.

Two more questions had been posted to these groups of students requesting opinions of their participation with IPA. Some of which are as described below. In general, they were keen to participate in IPA activities and impressed with the Press-in technology.

QUESTION 3: If IPA is interested to have more participation among students/ early careers, what will be your advice?

Widen the range of students to all over the world & create more interesting activities that students can participate.
Promote it through social media platforms, such as Facebook, Instagram, etc.
Give students an opportunity in working on-site and learn about the Press-in Technology
Offer mentoring programs that can help with knowledge, career advice and networking opportunities.
Promotion and program with the polytechnic.
It is very good to encourage a student to join IPA. From there, we get knowledge from newsletters, case history and others.

QUESTION 4: Please help us on how you describe Press-in Technology in not more than 30 words.

In my opinion, Press-in Technology is good to be practice in maintaining safe environment and sustainability in the future.
Trendsetter, life-changing, innovative.
Interesting technology used in various technical fields such as environmental, geotechnical, mechanical, instrumentation and construction engineering.
This is the first time I know about Press-in Technology; I think Press-in technology is much safer and sustainable as it can minimize the sound and the vibration.
It is safer and more reliable technology than conventional technology.
Press-in Technology is an eco-friendly piling works, construction revolution, and disaster recovery technology. Press-in Technology will not generate environmental pollution from construction such as noise and vibration.
The Press-in technology is an advance technology that keeps our environment clean and sustainable

Conclusion

The activity can recognize a young people view related to IPA and Press-in technology. The majority of the respondents believe that Press-in technology is environmentally friendly and sustainable. They also suggested several activities in linking IPA activities to the young people. The proposed activities such as a seminar session, site visit, mentoring program, knowledge sharing and promotional activities through various social media could be adopted in the near future. A similar study could be adopted in understanding and shaping practical strategies in promoting Press-In technology in other parts of the world.

Messages from Committee Chairs

Yoshiaki Kikuchi *(Professor, Tokyo University of Science)*

Research Committee

15 years have passed since the IPA was founded, but it has only been 5 years since the Research Committee was established in its present form. For the past five years, the Research Committee has been the center of the IPA's research activities that selects the research topics to be discussed in the technical committees (TCs), establishes new TCs, and supports their activities. In addition, the Research Committee has been collecting case studies and holding seminars on a regular basis to widely publicize the results of its research. The IPA has been covering a wide range of research topics, such as 1) research based on the principle of press-in piling, 2) research on the utilization of geotechnical information that can be collected during press-in piling, 3) research on the characteristics of structures constructed by press-in piling, 4) research on the construction method and construction management of press-in piling. This is due to the fact that the IPA is a group of experts such as geotechnical engineers, mechanical engineers and construction engineers, and the research topics have been selected to take advantage of this characteristic. In the next five years, the Research Committee will continue to promote its activities based on research themes from a broad perspective to leverage the IPA's characteristics, and also to promote researches in order to expand the IPA's research activities internationally.

Andrew McNamara *(Senior Lecturer, City, University of London)*

Awards Committee

I am delighted to be able to write a message as part of the IPA 15th anniversary celebrations; having been privileged to have been personally involved in IPA activities since 2007. As chair of the Award Committee, I have seen at first-hand how the ethos of the IPA has stimulated, encouraged and nurtured innovation. Over the years the Committee has worked hard, guided by Dr Masaaki Terashi and Dr Limin Zhang, to provide a focus for high quality research activities which have resulted in equally high-quality publications. The challenge for the Awards Committee during the next five years is to maintain these high standards whilst widening the appeal of the IPA activities to new regions worldwide. This means that there is an ambition to inspire new talented researchers to invest time and energy into tackling the challenges facing press-in engineering and gaining greater understanding of the press in process and fundamental behaviour. I feel certain that we will be able to meet these challenges and look forward to receiving nominations for awards from all quarters in the future.

Nor Azizi Bin Yusoff *(Senior Lecturer, Universiti Tun Hussein Onn Malaysia)*

Publicity Committee

On this day of the 15th IPA Anniversary, we want you to know what a pleasure it is to work with many of you earlier. The committee is responsible for publishing the IPA newsletter. “IPA Newsletter vol.1, 1” was first published in September 2016. Since then, IPA Newsletter has been published quarterly and still maintains its function to widespread the beauty of Press-in Technology. The committee is also responsible for maintaining and updating IPA websites. To date, the IPA websites are available in English, Japanese, and Chinese versions. In addition, our committee is also working closely with the Administration Committee in increasing the IPA membership. So far, the IPA is well presented by 30 board members, 717 individual members, 53 corporate members, and 74 students from all over the world. In the next five years, we hope to have more articles from our industrial partners and early careers. It is also possible to have IPA websites in several other languages. More students should be encouraged to enroll as student members. Anyway, thank you for being part of our contributors over the years. We look forward to many more successful years with you! Happy Anniversary.

Jiro Takemura *(Associate Professor, Tokyo Institute of Technology)*

Development Committee

Press-in piling method has been developed significantly in technology wise in the last few decades. However, considering its versatility and superiority, it could be said that the application is still rather limited in particular construction fields and also countries and regions. The dissemination and promotion of Press-in piling technology is the main mission of Development Committee through the promotional activities, such as international conference, multilingualization of Press-in Handbook, the seminar of Press-in Technology in various countries and regions. As the data accumulation and demand survey are critical to develop the technology in effective ways, we must enhance the further collaborations with the other standing committees and also promote the communication with the people in relevant and different disciplines all over the world. I believe these activities will assist the further development and new applications in various field, such as renewable energy and off-shore areas, for short- and long-term futures, which contribute to the development of sustainable world, including SDGs.

Chun Fai Leung *(Emeritus Professor, National University of Singapore)*

Administration Committee

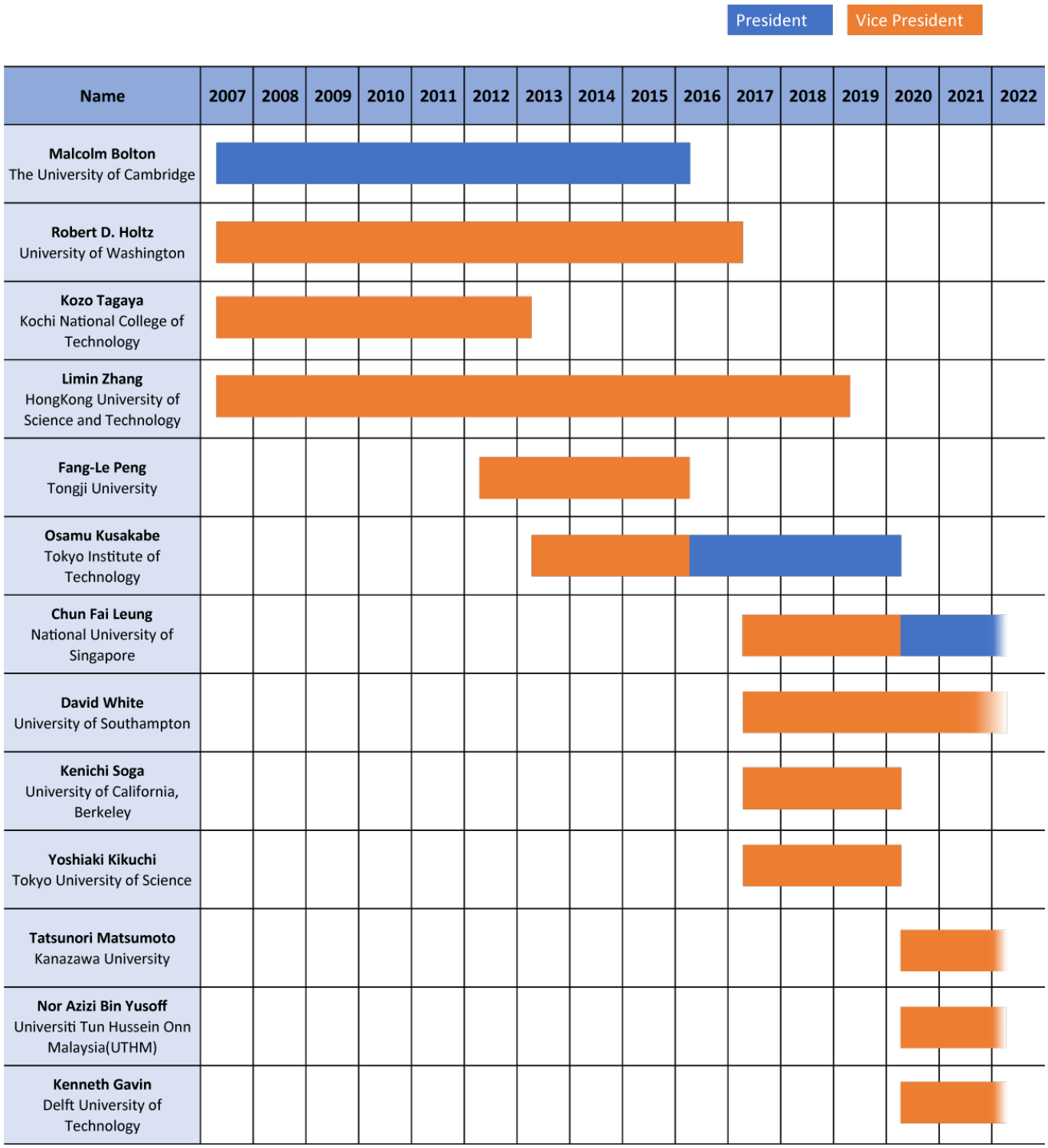
The Administration Committee is looking after the day-to-day operation and finance of the Association and supported by the secretariat which comprises of 6 full time staff. The secretariat plays a key role in communicating with IPA members and other interested persons. The secretariat staff has been doing a very job in the past with the production of the IPA Newsletter, the two very large international conferences, inaugural ICPE and 2nd ICPE, many international seminars and coordinating the IPA Technical Committee activities. There are major tasks for the IPA secretariat staff who has already actively working on the activities of 15th IPA Anniversary celebration including the publication of the IPA Newsletter Special 15th Anniversary issue and the 15th Anniversary celebratory events in 2022. In addition, they will play great coordinating roles in making the next ICPE to be held in 2024. The Administration Committee intends to carry on the good work of the previous Chair, Dr Osamu Kusakabe. It will further fine tune the operation of the Association to ensure that all functions and events can be held effectively and efficiently. The well-being and welfare of the important secretariat staff will be taken care of. To enhance regional activity, four regional offices (Netherlands, New York, Singapore, Tokyo) were established in 2018. At present time, each regional office prepares a timely report on the region to IPA Newsletter. It is anticipated in five years' time that each regional office may be strengthened, and then may have a capacity of planning and organizing regional seminars and operate some regional Technical Committees on the subject particularly important at the region.

Chapter 4

The IPA Community

Successive Presidents and Vice Presidents

As of January 2022

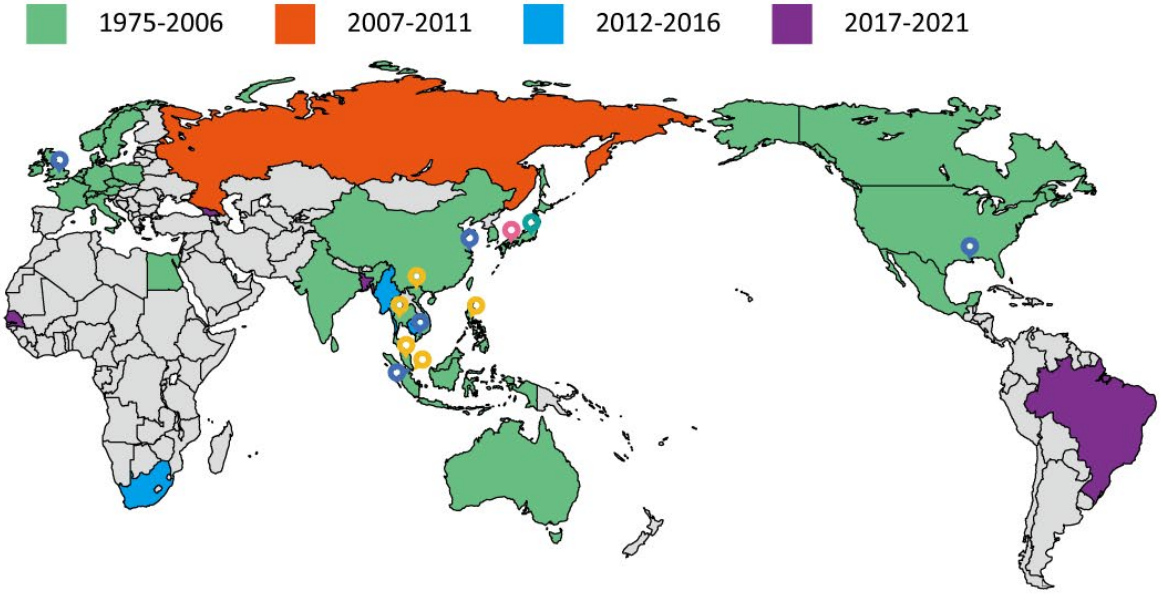


Affiliations are as of the date of appointment.

Global Activities

As of January 2022

Press-in piling technology applied in 43 countries/areas



The data is based on the achievements of Press-in project by GIKEN Group and their users.

International Workshop

5 Times UK, USA, China, Singapore, Vietnam

Press-in Engineering Seminars

12 Times Japan

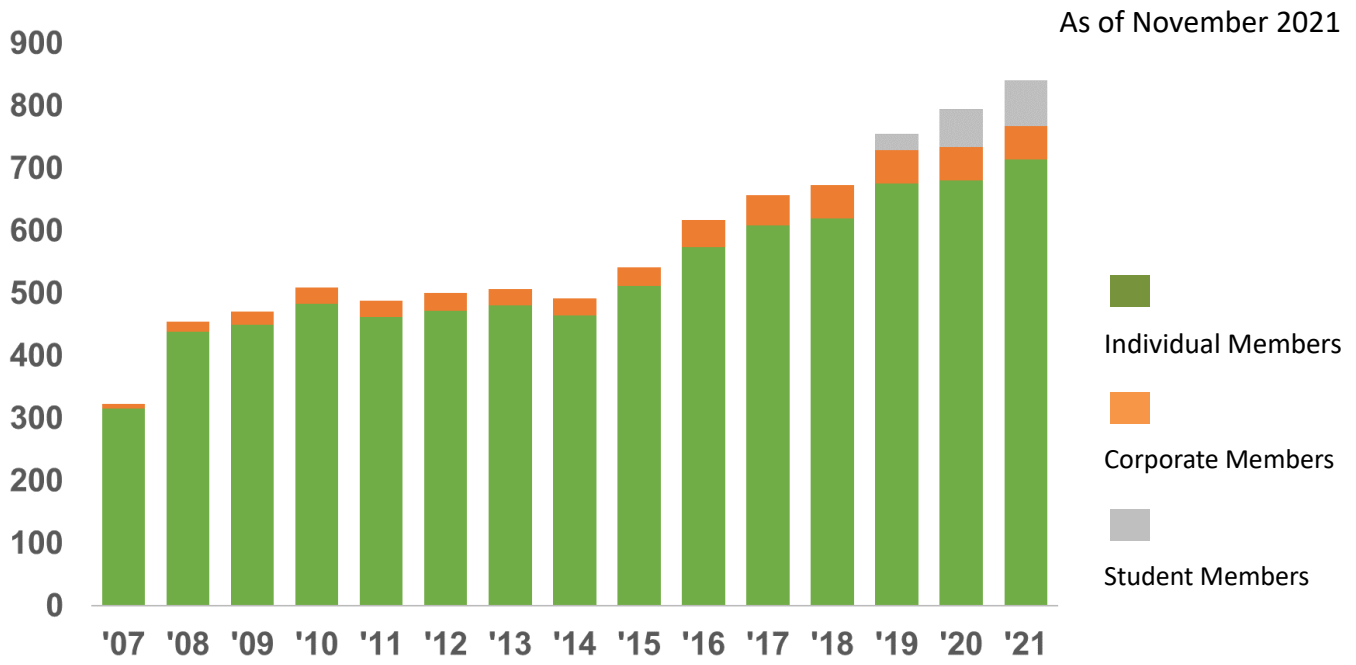
International Conference on Press-in Engineering

2 Times Japan

Seminars on Press-in Technology

5 Times Singapore, Malaysia, Thailand, Philippines, Vietnam

Members Data



Messages from Members

Corporate Member

Tomohisa Ozawa

President, Ozawa Civil Engineering and Construction Co. Ltd.

On the occasion of The International Press-in Association's 15th anniversary, I would like to express my heartfelt congratulations. Our company was founded in 1913, but since 1957, when we began applying a pile driving machine, we have been focused on being a company that specializes in driving precast piles. It has been over 30 years since we first used our Silent Piler, KGK130-C4, in the 1990s. The three-point pile driver had previously been the backbone until then, but the allure of Press-in Method entirely altered our pile driving machinery into Silent Pilers.

There are many enticing aspects of "The Press-in Method" such as the principle of the method to install piles into the ground using completed piles as reaction force, as well as the fact that the machine is so light and compact, but from my perspective, Press-in Method is simply superb. Many young people are enthralled by the prospect of operating compact and fashionable Press-in machine with a radio-controlled transmitter and performing methodical construction while clearing diverse ground and working circumstances. Our youthful employees, who joined us with the goal of operating the Silent Pilers in the same manner as senior operators, are working hard every day. In the other words, Press-in method is offering young people dreams and assisting them in acquiring skills to help develop social infrastructure and contribute to people safety and security.

The International Press-in Association (IPA)'s activities serve scientifically support and visualize field work, thereby enhancing the brand value of the Press-in Method, providing confidence and goals to our rejuvenated operators, and contributing to the revitalization of the Press-in industry. As the Press-in method becomes more widely used around the world, I believe that both construction techniques and scientific proof will become increasingly relevant. I would want to enlist your help in spreading the Press-in Method, which has attracted individuals from all around the world, by working together more closely.

Changyong Wang

Corporate Member

CEO, SHANGHAI TRUST MACHINERY IMPORT & EXPORT Co., Ltd.

Shanghai Trust Machinery joined the IPA in 2010 and has since contributed as a corporate member. For over a decade we have promoted press-in technology to companies domestically in China and internationally in Eastern Asia. Trust is dedicated to provide the most.

As a member, Trust Machinery stood by the IPA and witnessed steady growth and expansion. For 15 years, the IPA's devotion to streamline press-in technology was not wavered. The IPA is not only a forum for academics from all over the world to share theoretical insights, but a gathering of like-minded industrial inquisitors, always looking to improve and reform the current conventions. The IPA conducts researches and analyses construction data gathered first hand by its corporate members. The IPA always expects more from the press-in technology, and drives themselves to the next breakthrough.

15 years is an impressive milestone, yet it is only the beginning for the IPA. In the past decade and a half, as a member Trust Machinery had the pleasure to work alongside the renowned experts of press-in technology, made new connections and strengthened previous bonds. Trust Machinery thanks all members of the IPA for being part of the association's success. It is our hard work and thirst to innovate that guarantees IPA's success and prospects. Trust Machinery is a proud member of the IPA and looks forward to many years to come.

Koichi Maekawa

Individual Member

Former Director (2007-2019)

Professor, YOKOHAMA National University

It has been 15 years since the establishment of the International Press-in Association, and so dynamic activities have been continued in various fields such as technological development, dissemination, holding of international conferences and seminars, training of young human resources, and development of new fields. I want to congratulate those who have supported IPA. It goes without saying that the tireless efforts of many engineers and researchers have supported the rise of the Association. I myself have been mainly involved in the design and maintenance of on-ground infrastructures like reinforced concrete and steel. When I was appointed as an IPA board member, I did not have enough knowledge and experience in designing and constructing sheet piles and pile foundations, but the silent Press-in method of driving sheet piles was very exciting. I think that its high productivity illuminates the path that future construction projects should take. Also, the message of "visualizing the underground" still remains in my heart.

At that time, I was beginning to be aware of problems in the design and construction of underground structures such as transportation infrastructure, energy utility facilities and storage spaces. I am grateful that many people were able to share high-quality information and experience, as well as discussions on development and plans for the future, without being tied to any field or area within IPA. Although the International Press-in Association is based in Japan, it is noteworthy that it has been active with a strong international axis since its establishment. I think that the growth of young and mid-career engineers and the efforts of new themes are important achievements. We IPA hope that we will continue to lead new trends and expand our activities to improve infrastructure reliability and construction productivity, to strengthen mobility in emergencies, and to contribute to the carbon neutrality world.

Dang Dang Tung

Former Director (2016-2018)

Director, Ho Chi Minh City University of Technology (HCMUT)

Individual Member

I am pleased to offer my warmest congratulations to the IPA to celebrate its 15th anniversary. The 15th anniversary is a time for reflecting on the past and looking ahead to the future. Over the past 15 years, the IPA has established a worldwide network sharing an academic interest in the Press-in Method. Based on the spirit of Honor President, Mr. Kitamura and the solid foundation of the GIKEN LTD., the IPA has developed into a new framework, which gets rid of experienced bases, by researching the behavior of structures based on ground feature. The IPA has also established very strong platforms for cross-sectoral collaboration to assist different needy groups in the community in research and apply Press-in Method practically. Being our close working partner, the IPA has, in collaboration with Ho Chi Minh City University of Technology in co-holding the 5th IPA International Workshop in Ho Chi Minh City in 2014 and the Seminar of Expansion of Applicability and Assessment of Seismic Performance of PFS Method in 2017 is known as one of activities of Technical Committee 3. It has contributed immensely to the social contributions academic and human resource developments regarding the Press-in Method.

I have jointed IPA since 2014 with many different roles such as: Workshop organizer, director, grantee as well as presenter in The First International Conference on Press-in Engineering (ICPE) was held at Kochi University of Technology in Kami city, Kochi Prefecture, Japan on 19th and 20th September, 2018. I am happy and proud of these roles. I keenly look forward to witnessing the continuous achievements of the IPA along its mission of social commitment and its vision to become a world leader in education and research in Press-in Engineering. I would also like to convey my warmest wish for every success of the IPA' celebration of its milestone of the 15th anniversary.

S M Shafi

Ph.D. student, Tokyo Institute of Technology

Student Member

Congratulations on IPA's 15th anniversary! I am S M Shafi from Bangladesh. Currently enrolled as a Ph.D. student at Tokyo Institute of Technology. My research theme emphasizes studying the dynamic behavior of Cantilever Type Steel Tubular pile wall driven in the soft rock by physical modeling. Since 2020 I have become a student member of IPA, and its Technical Committee 1 (TC1). Thanks to the different activities of the TC1, I learned more about the practical application of steel tubular piles and the different challenges encountered in the actual construction site. Also, the continuous guidance and support from the TC1 help me to deepen my understanding of my own research. Moreover, in 2021 part of my research was presented in the 2nd International conference organized by IPA held online due to pandemic. This conference created a platform where I could share my research and ideas with others and vice versa.

As one of the economically hot-spot countries, the Bangladesh government has undertaken several mega projects to boost the economy with the help of different agencies, along with the Japan International Cooperation Agency (JICA) and the Asian Development Bank (ADB). Different development projects are running at sectors like airports, harbors, railways, and highways. Steel tubular pile could be used as an earth retaining structure to construct a new road in the hill tract region of Chittagong. Also, to retrofit the existing bridge structure or to construct a new bridge steel tubular pile could be used. Although the use of steel tubular piles seems expensive, however, the advantages like limited time, space, and labor taken by the press in method may overcome the cost based on my country's future scenario. With the accumulated knowledge from my research and IPA experts, I believe I will be able to contribute to the development of my country.

Corporate Members

Platinum Member (2)

GIKEN LTD.
株式会社 技研製作所
Japan

GIKEN SEKO CO., LTD.
株式会社 技研施工
Japan

Bronze Member (51)

Akatsuki Industrial Co., Ltd.
株式会社 暁産業
Japan

THE BANK OF KOCHI, LTD.
株式会社 高知銀行
Japan

CHIBAKOBEX Co., Ltd
株式会社 千葉コベックス
Japan

CHOWA KOUGYOU KYUSYU CO., LTD.
調和工業九州 株式会社
Japan

CKK GROUP
中部工業 株式会社
Japan

CITEC INC.
シーアイテック 株式会社
Japan

DAIICHI KISO CO., LTD.
株式会社 第一基礎
Japan

Daishin Kikou Co., Ltd.
有限会社 大晋機工
Japan

DAIWA-KIKO CO., Ltd
大和機工 株式会社
Japan

Endo Kogyo Co., LTD.
株式会社 遠藤工業
Japan

Fuji Tokushu Co., Ltd.
株式会社 フジ特殊
Japan

FUJIIGUMI Co., Ltd.
株式会社 藤井組
Japan

GUAN CHUAN
Guan Chuan Engineering Construction Pte Ltd
Singapore

Ishii Kiso-Contstruction Co., Ltd.
株式会社 石井基礎工事
Japan

ITOCHU TC CONSTRUCTION MACHINERY CO., LTD.
伊藤忠TC建機 株式会社
Japan

IZUMO GIKEN LTD.
株式会社 出雲技研
Japan

J STEEL ENGINEERING OUTCOMES
J Steel Australasia Pty Ltd
Australia

JFE Steel Corporation
JFE スチール 株式会社
Japan

Kajikawa Construction CO., LTD
株式会社 梶川建設
Japan

KAKIUCHI Co., Ltd.
株式会社 垣内
Japan

株式会社 角藤
KAKUTO CORPORATION
Japan

株式会社カナモト
Kanamoto Co., Ltd.
Japan

Kuroda Tekkou Co., Ltd.
有限会社 黒田鉄工
Japan

Kyoeisangyo co., Ltd
共栄産業 株式会社
Japan

Maruka Corporation
株式会社 マルカ
Japan

MC Chugoku Construction Machinery Co., Ltd.
エムシー中国建機 株式会社
Japan

MIYAZAKI KISO CONSTRUCTION Co. Ltd
宮崎基礎建設 株式会社
Japan

Mizuho Jyuki Co., Ltd.
有限会社 瑞穂重機
Japan

NARASAKI SANGYO CO., LTD.
ナラサキ産業 株式会社
Japan

NIPPON STEEL CORPORATION
日本製鉄 株式会社
Japan

Oobu Co., Ltd
Japan

Ozawa Civil Engineering and Construction Co. Ltd.
Japan

RINKO KORPORATION
株式会社
リンコーコーポレーション
Japan

Sakamoto Sangyo Co., Ltd.
サカモト 産業株式会社
Japan

Sakiyamagumi, Ltd
株式会社 崎山組
Japan

SANKOH MACHINERY CORPORATION
三興機械 株式会社
Japan

SATO JUKI Corporation
株式会社 佐藤重機建設
Japan

SEG Corporation
Japan

SHANGHAI TRUST MACHINERY IMPORT & EXPORT Co., Ltd.
China

SHANGHAI TUNNEL ENGINEERING CO., LTD.
China

SUGISAKI KISO CO., LTD.
杉崎基礎 株式会社
Japan

Takeuchi Crane Industry
竹内クレーン工業
Japan

THAI FULLMORE CO., LTD
Bangkok

THL FOUNDATION EQUIPMENT PTE LTD
Singapore

TUNGALOY CORPORATION
株式会社 タンガロイ
Japan

World Bless Construction Co., Ltd
China

Yagojidousha Seibi Koujyou Co., Ltd.
株式会社 矢後自動車整備工場
Japan

YOKOHAMA INDUSTRIAL PRODUCTS JAPAN CO., LTD KINKI COMPANY
横浜ゴムMBジャパン 株式会社
近畿カンパニー
Japan

Yokoyama-Kiso Co., Ltd.
株式会社 横山基礎工事
Japan

YONEI & CO., LTD.
Japan

Zefiro Corporation
USA

As of January 2022
Alphabetical order

Concluding Remarks

16 Feb 2022, marks a special date for IPA as it is the 15th Anniversary date of IPA. The IPA Newsletter Editorial Committee has prepared a special issue to mark the special occasion of IPA 15th anniversary issue. It contains valuable information on the historical development of the association including a summary of our activities and functions. The future of IPA is also deliberated in this special issue. Trust that all of you will enjoy reading this special issue.

IPA has plans for its future beyond its 15th year. One plan is to expand the association to include members, technical committee setup and board of directors to beyond civil engineering including other disciplines of engineering (e.g., mechanical engineering) as well as non-technical personnel (e.g., financial/economics personnel). If you have any inputs and suggestion on the future of IPA, please do not hesitate to contact the IPA Secretariat.

At the end, I would like to thank Prof. Michael Doubrovsky, Dr. Anh Tuan Vu, Dr. Osamu Kusakabe who are in charge of this issue and IPA secretariat members for their kind support and contribution.

Colin CF Leung

IPA President on behalf of IPA Board of Directors and Secretariat

International Press-in Association

国際圧入学会