Chapter 3

The Future Vision of Press-in Piling

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The Future of Press-in Technology

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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 A vast number of analogue activities have been replaced by digital technology.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.

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Future Prospects of Press-in Piling in Vietnam

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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.

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Future Vision of IPA: From Young People

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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)

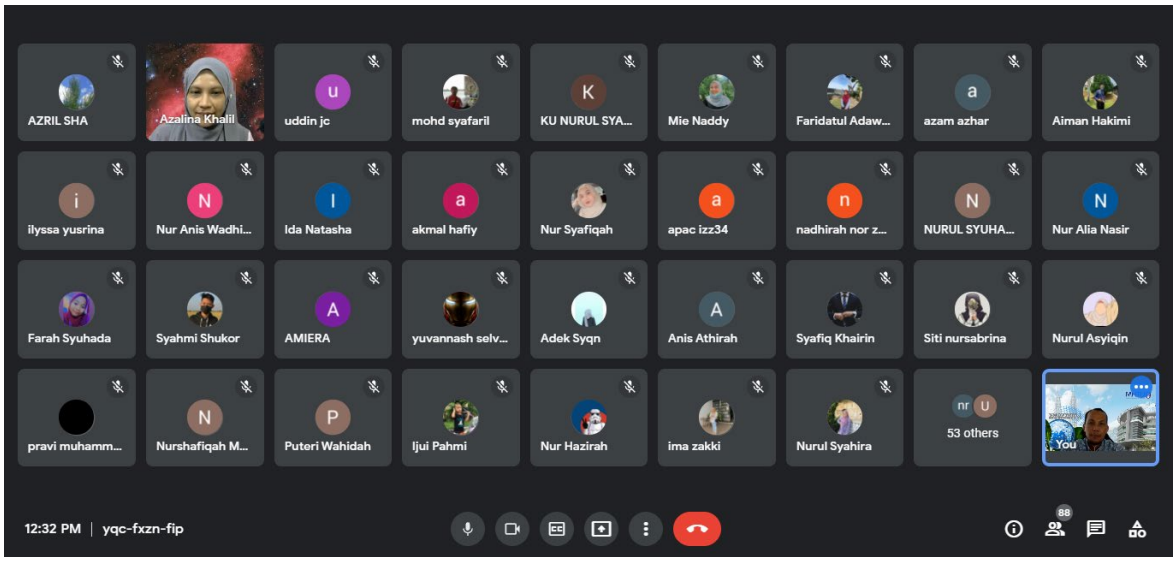

Fig. 2. The diploma student from Politeknik Tuanku Sultanah Bahiyah (PTSB), Malaysia

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?

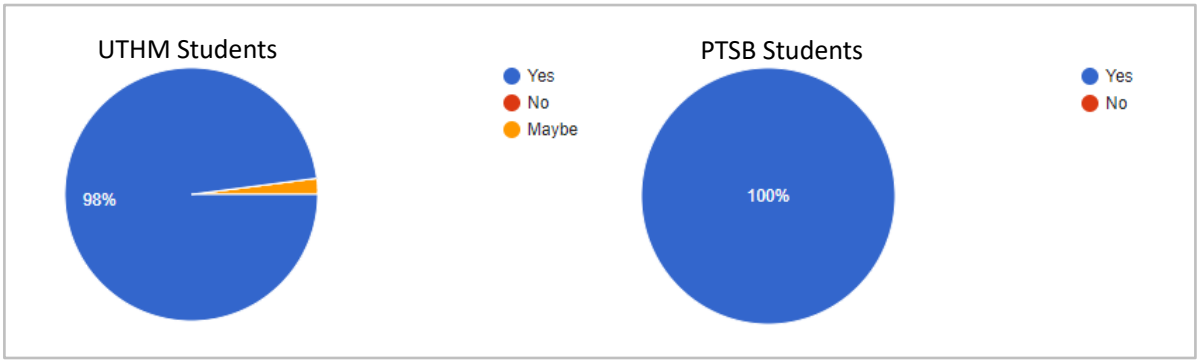

Fig. 3. The results of Question 1

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

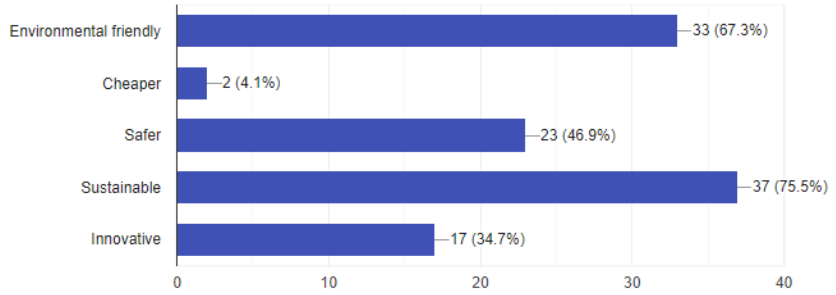

Fig. 4. The results of Question 2 (UTHM students)

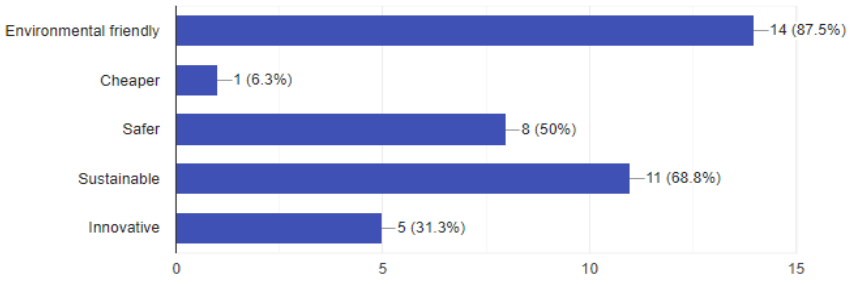

Fig. 5. The results of Question 2 (PTSB students)

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.