Establishment of Meiden Southeast Asian Technical Training Center

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Abstract

Overseas investments by Japanese firms have recently been very active. Due to the strength of the yen, there are many cases of Mergers and Acquisitions (M&A) among Japanese firms, with automotive industries taking the lead, that are aggressively expanding their overseas production hubs. Thanks to such investments, Meiden's overseas Group companies are also showing positive business performance. To strengthen quality and safety standards of Meiden's overseas Group companies, we introduced a group training system for engineers of overseas Meiden Group companies in the same manner as provided in Japan.

By transferring the Meiden Group's philosophy and technological expertise to overseas Group companies, we ensure its safety standards, increase quality and technological capacity and enhance customer satisfaction. For this purpose, the Meiden Southeast Asian Technical Training Center was founded in the suburbs of Bangkok, Thailand.

1 Preface

Within Southeast Asia, we have manufacturing bases in Singapore and Thailand. We also have engineering bases in Thailand, Singapore, Malaysia, and Indonesia. Meiden's overseas Group companies in Thailand and Indonesia were established many years ago. As of 2017, our subsidiary in Thailand has existed for 51 years, while the Singapore office welcomed its 40th anniversary in 2015. Since its foundation, each started with some Japanese expatriates and local employees. They mainly acquired orders and conducted on-site installation work. Recently, as these construction companies became full engineering firms and Japanese companies showed an increase in overseas operations, however, customers have come to expect the same quality standards as Japan in Meiden's overseas Group companies. It became a challenge for the Meiden Group to maintain the same quality and reliability our customers expected. Although education programs were provided in Japan for their local engineers, the training did not deliver the results we had hoped for, as overseas Group companies could only send a limited number of engineers to participate in such training in Japan. To effectively train engineers at Meiden's overseas Group companies, we founded the Meiden Southeast Asian Technical Training Center. Fig. 1 shows how we operate the Technical Training Center. This paper introduces the purpose of establishing the Technical Training Center and the respective training programs.

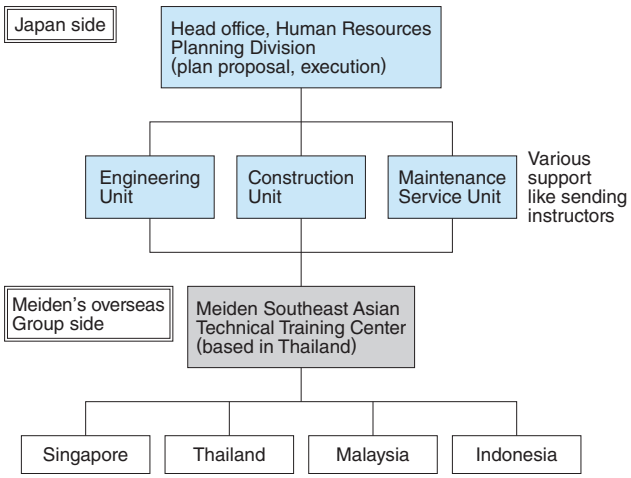

Fig. 1 How We Operate the Technical Training Center

This program is not only planned and executed by the Technical Training Center but is also supported and cooperated by the Human Resources Planning Division of Meiden Head Office, Tokyo and other related Business Units (hereafter, Units).

2 Purpose of Establishing the Technical Training Center

For local employees of Meiden's overseas Group companies, we introduced a job grade system to clarify career progression and talent development at each ASEAN company. At the time of establishing the Training Center, we researched employee demographics at each Meiden's overseas Group company in the ASEAN region. A common issue for each ASEAN company was that there were many inexperienced employees, and a substantial age gap between them and the managerial staff.

Given the aforementioned, we founded the Training Center. The Training Center's main objectives are for engineers to learn basic engineering skills, develop expertise, and adopt Meiden's corporate philosophy and code of conduct. The program is also designed for engineers to provide the best product and service experiences for our customers. In addition, the program aimed to promote networking and communication between the Meiden employees from different companies and countries.

3 Planning the Contents of the Training

Prior to establishing the Technical Training Center, we assessed the skill level of our engineers at Meiden's overseas Group companies. The retention rate of young engineers in ASEAN is lower than in Japan, which contributed to a prominent age gap between young employees and managerial staff. We also recognized that there was an insufficient transfer of basic engineering skills and expertise needed for engineers.

Prior to the establishment of this Technical Training Center, education programs were initiated and managed by each Meiden's overseas Group company. As such, there was no common educational program for young employees and inexperienced engineers. At the time of establishing the Technical Training Center, the center's curriculum was reviewed by the project group responsible for establishing the Technical Training Center. Table 1 shows the list of training courses.

Table 1 List of Training Courses

The objectives and contents of the training programs are outlined below.

Course	Objective	Contents
Corporate philosophy	Building awareness as a member of the Meiden Group	Explanation of corporate philosophy
Management policy	Building awareness as a member of Meiden Group	Explanation of management policy
Quality control in general	Acquisition of quality control approach according to Meiden standard	Quality improvement course, "5 Whys" analysis, case study on defects
Safety control in general	Acquisition of safety control approach according to Meiden standard	Knowledge about general working safety, TBM, KYK, examples of OHS incidents, and safety simulation training
Design	Acquisition of design approach according to Meiden standard	Existing design and drawings
Construction	Acquisition of construction approach according to Meiden standard	Existing design and drawings
Products and maintenance	Knowledge on products and acquisition of maintenance skills	Training on products at a factory of Meiden's overseas Group firm
Site Acceptance test	Securing quality level by standardizing the Site acceptance tests	Explanation of existing site acceptance test data
On-the-Job Training (OJT)	Raising technical level of each Meiden Group firm	OJT training among Meiden Group firms exchanges and mutual interactions

4 Training Plan

As of April 2015, the Meiden's overseas Group companies in the Southeast Asia have a total of approximately 650 employees in four different countries. About 500 employees of these are engineers who are engaged in construction projects. About half of them are young inexperienced engineers.

To uniformly increase the skills of each of our engineers in the shortest amount of time, we set out to increase the maximum efficiency of the training by grouping engineers by similar skill level. This was based on the results of an employee survey conducted at each Meiden Group company. The first training course was in July 2014 and was held six times a year, recurring every two months. Table 2 shows a list of fiscal 2014 and 2015 training schedules.

5 Contents of Training

5.1 Recurrence of Failures Prevention

Based on the training materials used in Japan, we gave a lecture on the prevention of the recurrence of disasters resulting from system failures. Based on our case studies in Japan, we conducted group training for the analysis of root causes of

Table 2 List of Fiscal 2014 and 2015 Training Schedules

The training schedules were decided for Fiscal 2014 and 2015 while considering national holidays in ASEAN countries.

Outline of training		Fiscal 2014																Fiscal 2015															
		Jul			Aug			Sep			Oct			Nov			Dec			Jan			Feb			Mar			Apl			May			Jun		
		1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
General	Corporate philosophy and management policy																																				
	General quality and safety control																																				
	Examples of defects and OHS incidents																																				
	Defect analysis training																																				
Design	Construction design basic																																				
	Each work process and procedures																																				
	System design basics																																				
	System design application course																																				
Construction	Mechanical construction design guide																																				
	Large equipment installation guide																																				
	Electrical construction work guide																																				
Products	Switchgears																																				
	Transformers																																				
	Circuit breakers																																				
	Control panels																																				
Site Acceptance tests	Visual inspection																																				
	Insulation resistance test																																				
	Functional test																																				
	Protection relay test																																				
Major events in neighboring countries		Ramadan (Muslims) June 29～July 27 Lebaran: Approx. one week after Ramadan									Deepavali (Hindu) October 22												Chinese New Year February 19						Songkran Festival (Thailand) April 13～15								

Fig. 2 Group Drill

A view of the "5 Whys" analysis training is shown. Since this training was unfamiliar to trainees, instructors helped to facilitate the session.

disasters or the "5 Whys" analysis (see **Fig. 2**.). Since there were many engineers who had never conducted an analysis to determine a possible cause, it was a challenge for them to determine root causes of cases of failures. When the participants were guided through the "5 Whys" process through group discussions, however, this training provided an opportunity for the participants to develop a mindset for problem solving. After the group discussions, participants had to present their findings, which helped them understand the challenge of communicating their message to an audience.

5.2 General Introduction of Safety Management

Although the ASEAN region is often perceived to be a single region, there are different safety programs and protocols in each country. Introducing risk assessment programs and assigning certified safety personnel to project sites differs from each country. For engineers, there are many technical factors concerning Occupational Health and Safety (OHS)-related activities. Generally, a safety repre-

sentative overseeing OHS matters is assigned.

To improve the safety awareness of engineers, we conducted a general safety lecture (also introduced in Japan).

(1) Safety is first priority.

(2) Safety = Customer's trust = Stable corporate management

These principles are not limited to only engineers, so we instructed training participants to conduct the OHS education for their own workers at their respective companies after returning home.

5.3 Hazard Prediction Activity ("Kiken Yochi Katsudo", or KYK)

KYK, or hazard prediction exercises, are commonly conducted in Japan. Risk assessment, however, is more common in the Southeast Asian countries. The concept of KYK is not familiar to them, except to those engineers who serve Japanese customers in his or her respective country. Risk assessment involves planning and evaluating physical risks, while KYK is a plan to improve overall safety awareness. Since KYK leverages on the results of the risk assessment, it is an effective safety management method for on-site work. Even for the Japanese employees, it requires getting accustomed. For engineers not familiar with this approach, they were challenged by their lack of experience. In the early stages of group discussions, some groups arrived at an impasse and needed guidance from the lecturers. It was a meaningful lecture since after returning to each country, some engineers reported to their company that they would promote KYK activities. Fig. 3 shows a KYK sheet and Fig. 4 shows a participant giving a KYK presentation.

Date: / / Hazard Prediction Act Sheet Sheet No.

Scheduled Work

Work Sequence	Potential Danger / Hazard in the Work scene (Type of Potential Dangerous / Hazardous Condition,Act,Accident)	Countemeasure plan to maintain safety condition / Quality Assureance (Practical Counter measure plan to eliminate Potential Danger / Hazards)	PIC	Verification: Foreman	Verification: Site Mgr.
Example	Example) Slip out on scaffold built in 2nd floor Mechanical room and fall down	Example) Install Fall protection Safety, Keep upperbody inside of Scaffold	John	レ	レ
1					
2					
3					
4					
5					
Highly Prohibited Work					

Examples of Typical Dangerous / Hazardous work critical points (Use as reference to practically write your plan)

High Place Work	Rigging Work	Electrical work	Fire permit work	General
1. Where would fall Accident happen?	1.Why does Riging machines roll-over?	1. Where has potentially danger of Electrical shock?	1. Any potential ingition to Flamable items?	1. Any place Collision hazard?
2. Where can potentially have fall accident?	2. Why drops Product during carry-in work?	2. Any place potentially cause Short circuit?	2. Any place potentially cause Fire /heat burn?	2. Any place break through floor material hazard?
3. Where can potentially have drop accident?	3. Why does Captured between objects?	3. Any place potentially cause Fire/Heat Burn injury ?	3. Any place potentially draw explosion?	3. Any place cutrabrace hazard?
4.Any Slippery spots?	4. Any Buried/embeded items in work area?	4. Any Potential Mis-Connection / Mis-Cutting cables/ piping?		

Team Action Target: (Fix "Point-ACall" target, verbally call 3 times of summarized Team action Target) Ok!

Worker's Authorization (Each worker's sign required Foreman sign required only at the bottom)

Team name | Foreman name

•In "Verification" check box, Foreman or Site manager confirm countermeasure action and note checkmark.
•Foreman Must post this sheet at Team's Work area and after the work has completed Site manager must keep the sheet as record
•Acess Hazard / Dangerous point, and pratically write down on this sheet.Under-line most Critical item(Team action target) Based on : 1/7/2014 ver.
•"Team Action Target" should be copy & paste from the column "Practical Counter measure plan to eliminate Potential Danger / Hazards")of most critical item (Do Not omit the description)

Fig. 3 KYK Sheet

We translated the template used in Japan into English.

Fig. 4 Participant Giving a KYK Presentation

The KYK performed by each group was presented and the results were evaluated.

5.4 Safety Simulation Training

In the 1970s, Japanese working conditions were so dangerous that there were around 3.5 times as many workplace accidents as compared to today. Due to improved safety education, advancement of safety tools, improvement of work processes and safety management systems, working environments have progressed to today's standards. In recent years, however, workplace accident rates in Japan have reached a plateau (this trend is common throughout all industries). It is generally believed that this is due to the slow response in addressing human errors.

Recently, starting with the construction sector, "safety simulation training" has become an increasingly popular education method to reveal underlying dangers in the workplace and enable employees to instinctively assess the dangers around them. Our safety simulation training programs are as follows:

(1) Low voltage electric shock

The trainee personally experiences an electric shock in order to understand the difference between each risk of a dry state and wet state.

(2) Electric cable/cord reel burnout

The trainee witnesses a scene where a cord is burn out by an overcurrent.

(3) Feeling the impact of a falling object

The trainee, wearing a helmet, experiences the actual impact caused to their body from a falling object.

(4) Suspending equipped with a safety harness

The trainee personally experiences the discomfort caused by not properly wearing a safety harness.

(5) Discharge and grounding

The trainee sees the impact caused by residual electrical charges.

(6) Observing the strength of a safety shoe

The trainee sees how a safety shoe is able to withstand great impact.

We began adopting this education method about five years ago. After increasing the number of our training facilities and conducting the program at Meiden's various business locations in Japan, we felt that this program would be effective in Meiden's Southeast Asia training program and incorporated the safety simulation training in each respective curriculum.

Fig. 5 shows the safety simulation training introduced in 2014 and Fig. 6 shows the additional safety simulation training introduced in 2015.

Unlike a lecture-style class (a passive reception of knowledge), this method allows trainees to learn OHS protocols through personal experience and supplement their lack of experience on site. We intend to introduce these training facilities in the future.

5.5 Site Work Management

The work involved in construction management is wide-ranging and it takes a substantial amount of time to cover all topics. As such, we selected an essential training, "Basics of carry-in planning," which we felt was lacking for engineers.

Since companies tend to rely on subcontractors to carry out the work, local engineers are less familiar with lifting work. Many engineers have, therefore, never drafted a carry-in plan. Even if products were delivered to a work site on time, efforts would be wasted if products were damaged

(a) Watching an actual electric cable/cord reel burnout

(c) Impact of a falling object

(b) Experiencing an impact of an item dropped on a helmet

(d) Experience of suspension with a safety harness

Fig. 5 Safety Simulation Training Introduced in 2014

Views of four safety hands-on experience program introduced in 2014 are shown.

(a) Experiencing the phenomenon of discharge and grounding

(b) Watching the strength test of safety shoe

Fig. 6 Additional Safety Simulation Training Introduced in 2015

Views of two safety hands-on experience program introduced in 2015 are shown.

Fig. 7 Presentation

After group training for various engineers from different nations and different work experiences, each engineer made a presentation as if it were given to customers.

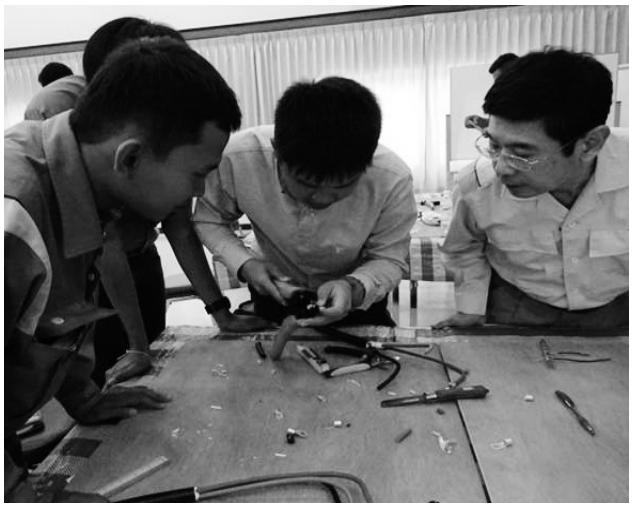

Fig. 8 Low Voltage Cable Termination Work

Since there were some trainees who were familiar and some not familiar with the work, we carefully checked their group work to avoid any injuries from occurring.

during the phase of lifting and carrying-in. Together with teaching videos produced in Japan, these are the basic information needed for drafting a construction plan, as well as conducting lectures about carry-in route plans, and essentials for crane selection and installation. After a lesson, trainees were required to draft a carry-in plan according to a given set of conditions and present it to their class (see Fig. 7.). In the initial stages of the group discussion, some groups were challenged, not knowing what to do. Each group, however, gradually began to draft a plan with support from the lecturers and training staff. The final plans were reviewed and evaluated by other groups. Since the plan was produced through mutual discussions among the participants, each trainee learned the protocols of different countries and provided a platform for communication.

Fig. 9 Torque Management Training

The training helped participants rethink whether it was sufficient to simply tighten the bolt.

5.6 Low Voltage Cable Termination Work and Torque Management

Problems frequently arising on work sites are mostly related to low voltage cable termination work and torque management. Although both are important for electrical construction work, many participants, did not know the technical background of low voltage cable termination work and torque management.

Fig. 8 shows low voltage cable termination work. Since the licensed worker system was introduced in Japan, we considered introducing a similar system for our overseas Group companies. In the meantime, however, we decided to focus our attention on the acquisition of basic working knowledge and understanding of technical backgrounds. In the future, the licensed worker system at our Group companies will be introduced as it is managed in Japan. As such, engineers as well as all workers will know this system so that all related failures on termination work can be eliminated.

Fig. 9 shows a torque management training. The participating engineers are mostly familiar with torque values according to bolt sizes and materials. They did not know, however, the technical reason for the need for torque management, similarly as in

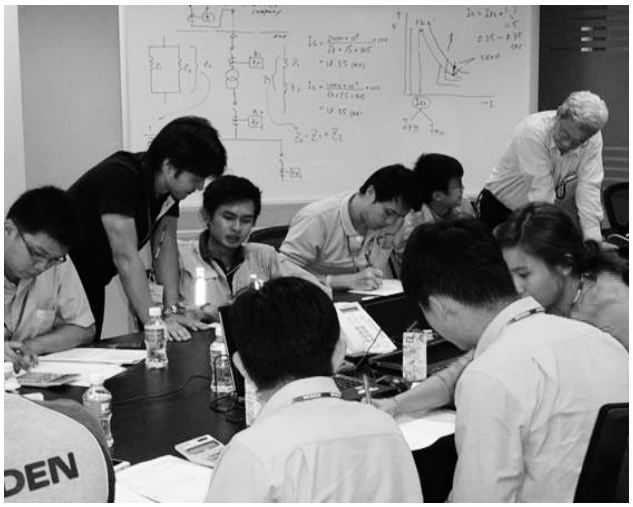

Fig. 10 Protection Coordination Training

A view of trainees working intently in the training is shown (supported by training staff).

the case of low voltage cable termination work.

In this training, we conducted lectures about torque management by conducting a hands-on activity. Under our training program we taught technical backgrounds and working procedures.

5.7 Design Basics

For an Engineering, Procurement and Construction (EPC) contract, all work relating to engineering, procurement, and construction are addressed in a single contract. For this reason, basic knowledge and skills relating to construction alone are not sufficient to successfully execute such a contact. Accordingly, our lectures are composed of two parts: system design basics such as single line diagram, protection coordination, and sequence and construction design which includes basics cable selection and cable route selection. **Fig. 10** shows a view of protection coordination training.

5.8 Site Acceptance Test (SAT) Basics

To complete an EPC contract, it is necessary to combine goods to be purchased and the designing of a system. It is essential to carry out the SAT. For some of our Group companies, there are cases where an in-house specialist team does not exist to carry out the Commissioning tests. In addition, there are many projects where many products must be purchased from non-Meiden suppliers. Although they can hire service providers for the Site Acceptance tests, they cannot discern if the tests are conducted correctly based solely on test records

Fig. 11 Protection Relay Test

Each trainee is working intently on the program. We expect their technical level to advance further.

Fig. 12 VT Test

A view of a training and the trainees supporting each other.

if they don't have sufficient basic knowledge.

Consequently, we provided training on the minimum basic items relating to substation facilities (polarity test, low-voltage injection test, protection relay test, and VT test) **Fig. 11** shows a protection relay test and **Fig. 12** shows a VT test.

6 Postscript

The Southeast Asian Technical Training Program was conceived in 2014. First, we had to prepare lesson materials and work with our head office staff. This program is currently being managed mainly by Japanese staff. Going forward, we aim to increase lecturers of local staff while improving training materials. We expect an increase in the localization of the program's lecturers, with a target ratio of 50% local lecturers and 50% Japanese staff. Although lecture contents touch on essential

skills for EPC engineers, it is, however, impossible to learn everything from only this training course. We expect this program will provide an incentive to learn more about the topics covered. We also expect a decrease in flaws at the project sites through better communication with Japanese staff through cross cultural exchanges provided by this program.

In the future, we are planning to establish an ASEAN Technical Center (tentative name) by selecting engineers from Meiden Group companies. This will be an organization capable of carrying out technical support for our many projects in the ASEAN.

Currently, this Center is offering training courses limited to the ASEAN locations. In the future, however, we are planning to offer similar training programs to our Group companies in China and other countries. We want to contribute to "developing construction skills and knowledge while focusing on the safety and quality", regardless of any country or region.