

Passing on Skills and Expertise by New Meiden Engineering Center “Manabi-ya” (a “Learning Place under One Roof” in Japanese)

Keywords Maintenance, Education for new employees, Training, Practice

Abstract

In the repair and maintenance service Business Units (BUs), it is of utmost importance to train and strengthen reliable field service engineers. In doing so, we provide high quality and highly safe service to our customers for their peace of mind. In addition to the existing Meiden Engineering Center, we established a new engineering center in October 2020. This is for new recruits of technical personnel of Meiden Group to get their expected competency early. This includes the repair and maintenance service BUs. With this purpose, we began Meiden Academy Program.

In this educational facility, new recruits of technical personnel are divided into small groups and will take one year of practical training programs from dedicated instructors. In doing so, they will learn “Safety First”, “the entire manufacturing processes”, “shop tests using actual power products”, and “lessons from the past failure cases”. Such curriculum is designed to learn these basic matters using special teaching materials. Through practical trainings, we are working on Human Resource (HR) development to foster the attitude of thinking why such procedures or steps are required with the help of dedicated instructors.

1 Preface

In 2000, we opened Meiden Engineering Center adjacent to the premise of Meiden Numazu Works as a training base for repair and maintenance service engineers, have provided training programs for new recruits, education for multi-skilled employees, and technical education programs for customers. Furthermore, in October 2020, a new Meiden Engineering Center called “Manabi-ya” (a “learning place under one roof” in Japanese) was opened to consolidate and enhance technical education and training programs, and to strengthen the transfer and acquisition of skills and expertise. At this center, Meiden Academy Program was newly established and started with the aim of accelerating HR development of new recruits. This paper introduces the outline of the New Engineering Center and the efforts for Human Resource (HR) development in Meiden Academy Program.

2 Outline of New Engineering Center Facilities

Facilities at the New Engineering Center are as outlined below.

2.1 New Engineering Center

Two-storied in steel construction
 Area of premises: 3072 m²
 Total floor area: 2764 m²

2.2 Training Rooms

Fig. 1 shows a layout drawing of the training rooms arranged to realize any training program according to the class size.

Training rooms (small): 24 m² with a capacity for 8 persons × 2 rooms

Training rooms (medium): 84 m² with a capacity for 32 persons × 3 rooms

Training rooms (large): 117 m² with a capacity for 54 persons × 2 rooms

2.3 Practical Training Area

Fig. 2 shows a layout drawing of the practical training area suitable for various kinds of target product models for repair and maintenance serv-

ices. There are practical training areas and dedicated power facilities for the training.

(1) Practical Training Area for power receiving and transforming facility

Power receiving panels, feeder panels, power transformer panels, capacitor panels, etc.

(2) Practical Training Area for water treatment plants

Monitor panels, instrumentation panels, PLC panels, control center panels, and a set of water supply and water intake reservoir facilities.

(3) Practical Training Area for power conversion equipment

DCP, UPS, photovoltaic PCS, and a set of power load facilities.

(4) Practical Training Area for speed control equipment

VVVF panels, control panels, etc. and a set of winding machines.

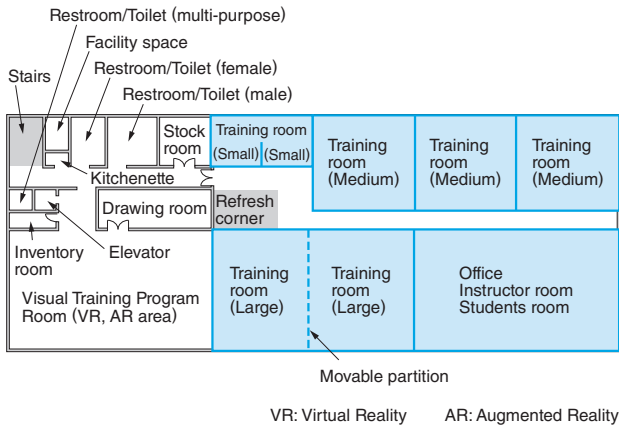
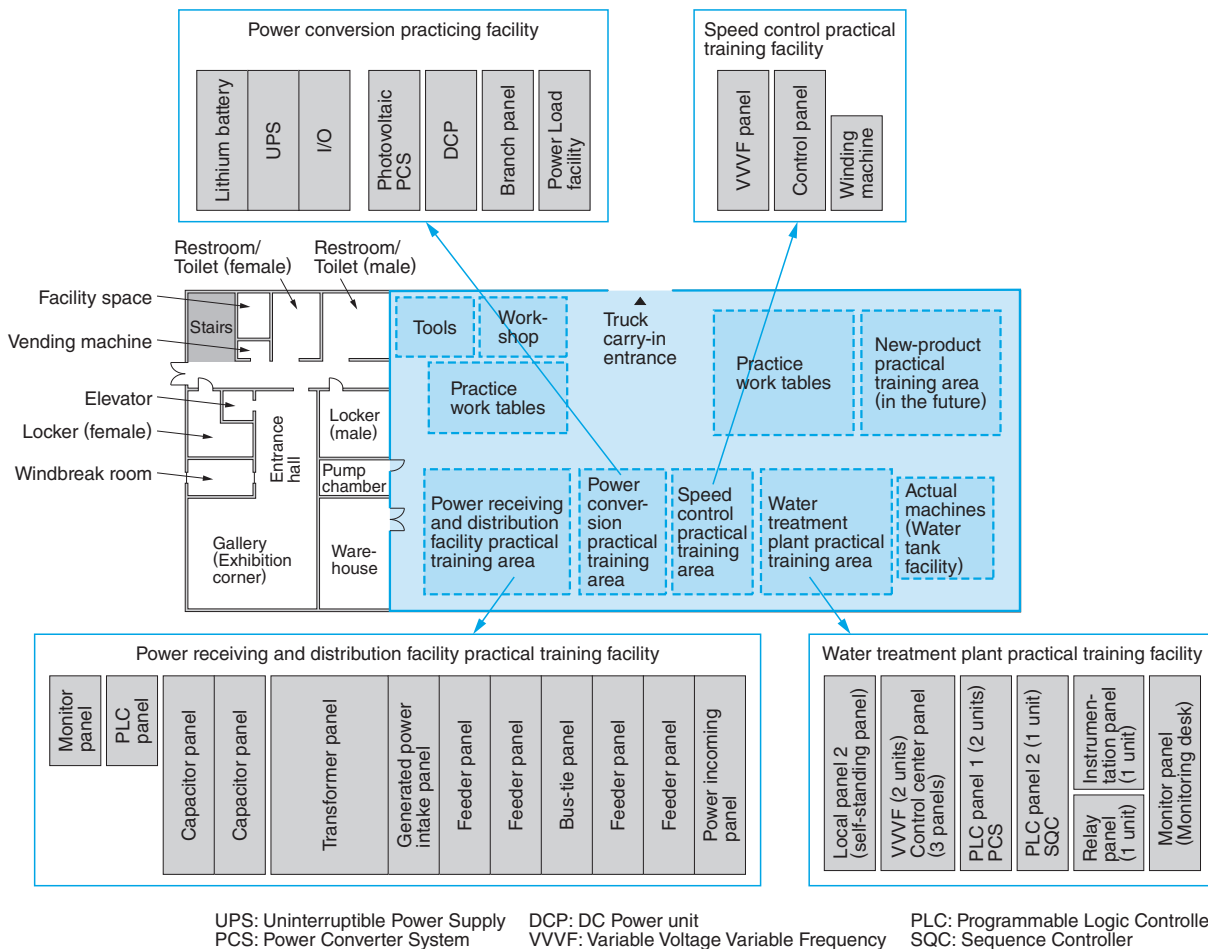


Fig. 1 Layout Drawing of Training Rooms

Training rooms applicable from 8 persons to 108 persons at the maximum are allocated on the second floor.

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UPS: Uninterruptible Power Supply DCP: DC Power unit PLC: Programmable Logic Controller
 PCS: Power Converter System VVVF: Variable Voltage Variable Frequency SQC: Sequence Controller

Fig. 2 Layout Drawing of Practical Training Area

Practical training area is arranged on the 1st floor based on the product-based training area and dedicated facilities. The main purpose is for new recruits in repair and maintenance service BUs to get their expected competency early.



Fig. 3 View of Practical Training of Meiden Academy Program

Practical training programs are available to deepen the understanding early by operating actual machines.

3 Meiden Academy Program

New recruits of technical personnel are divided into engineering training groups for power receiving/distribution facility, water treatment facility, power conversion facility, and variable speed control facility. It depends on where they will be later assigned to workplace. They will learn specialized skills for each group. Its features are as follows.

(1) Small-group-based education

Fig. 3 shows a view of a practical training of Meiden Academy Program. By studying continuously for one year with dedicated instructors and members of a small group, the program will provide detailed technical education according to the progress level. It also teaches the importance of “greetings” at work and important business attitude in Japan called “Ho-Ren-So” where “Ho” means “Hokoku (report)”, “Ren” for “Renraku (communicate)”, “So” for “Sodan (consult)”.

(2) Safety first

“Safety is absolutely paramount” is repeated and practiced in daily training work. These will include checking the quantity of tools and measuring instruments before starting the training, grasping the range of work, practicing KYK (Kiken Yochi Katsudo) meaning a hazard prediction activity, risk elimination, carrying out “curing work” which means “protecting” the building or designated objects at the site by covering the building or the objects with a vinyl sheet or mesh sheet, checking reinstatement work (restoring a space back to its original state) at

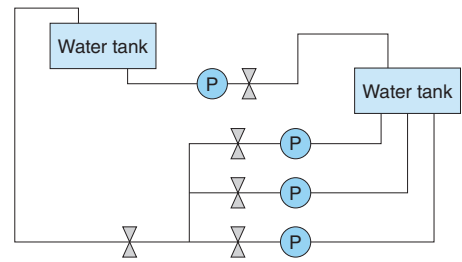


Fig. 4 Example of Water Tank Facility for Commissioning Test Training

An example of a commissioning work training facility by water tanks and pumps is shown. This is to acquire higher level techniques like control response.

the end of the training, 2S activity (seiri “sort” and seiton “set”). They will practice these matters every day. In doing so, they will acquire the most important basic habits required in the workplace as a field service technician or engineer.

(3) Understanding of the entire process

To understand the entire manufacturing process, some of the sheet metal processing, painting work, panel assembly, and wiring work, which could not be experienced in the practical training course so far, will be incorporated in the Meiden Academy Program. In order to realize this curriculum, an unfinished distribution panel will be prepared, skilled workers in the manufacturing Business Units (BUs) will show the manufacturing steps, and the workers will give them instruction while observing how new recruits are performing the assembly work.

(4) Commissioning Work Using the Actual Machine

Fig. 4 shows an example of a water tank facility for commissioning test training. In the water treatment plant training equipment area, we installed a water tank, pump, and the operating status and measured values are displayed on the monitoring panel. We built a system that can make an adjustment for the commissioning work in the same environment as the site. In this way, automatic control training such as constant water level control, flow rate control, number control, and interlock will be conducted. Similar adjustment equipment is installed in other training areas.

(5) Learning from failure cases

Workers will learn by looking back on past failures and malfunctions and will learn what is the real cause in each case and why such countermeasures are needed. **Fig. 5** shows an example of a capacitor misconnection burnout experiment. After ensuring the safety of what can be reproduced, they will go

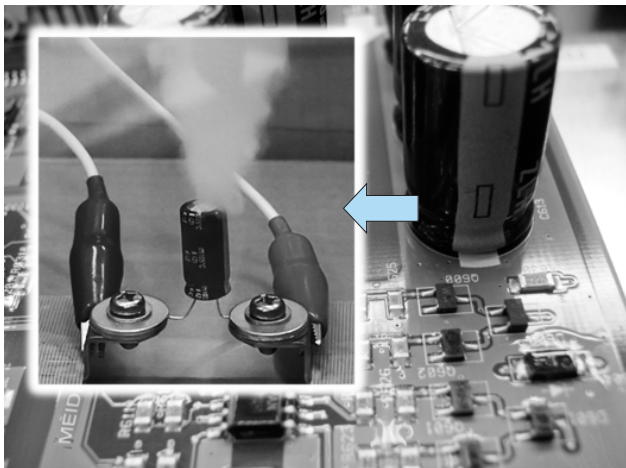


Fig. 5 Example of Capacitor Misconnection Burnout Experiment

The trainees can experience what happens as a result of a reverse connection of the capacitor polarity through a practical experiment where voltage is actually applied to a wrong connection.



Fig. 6 Example of Working Procedure Explanation by Withstand Voltage Test Video

By virtue of video narration and inserted telop (television opaque projector), the trainees can easily understand the procedures of the withstand voltage test.

through the actual experience of the failure. In doing so, they will deepen their understanding.

(6) Improvements of educational contents

Fig. 6 shows an example of working procedure explanation by withstand voltage test video. Meiden Academy Program uses materials such as design documents, drawings, standards, and procedure manuals. We are designing a curriculum that ensures that students can acquire electrical theory and test procedures by combining classroom lectures and practical training programs. We incorporate video clips into the lecture materials and

| Former education system | First year | | Second year | | Third year | |
|---|-----------------|------------------|-----------------|------------------|-----------------|------------------|
| | First half year | Second half year | First half year | Second half year | First half year | Second half year |
| Education for new recruits | → | | | | | |
| Factory OJT training (1.5 to 2.5 years) | | → | | | | |
| Assignment to field service BUs | | | | | ■ | ■ |

| Introduction of Meiden Academy Program | First year | | Second year | | Third year | |
|--|-----------------|------------------|-----------------|------------------|-----------------|------------------|
| | First half year | Second half year | First half year | Second half year | First half year | Second half year |
| Education for new recruits | → | | | | | |
| Meiden Academy Program (for one year) | | → | | | | |
| Assignment to field service BUs | | | | ■ | ■ | ■ |

Fig. 7 HR Development Plan to Get their Expected Competency Early

This shows the time for assignment to the workplace is advanced by the introduction of Meiden Academy Program.

record the training work there. The trainees will reflect what they learned and in doing so, we will promote understanding and early training of field service engineers.

4 Getting their Expected Competency Early

Fig. 7 shows our HR development plan to get their expected competency early. Factory training (for duration of 1.5 years through 2 years) that had been carried out in the past after the recruit training. Instead, Meiden Academy Program will carry out for only one year at the New Engineering Center. Each repair and maintenance service-related BU drafted an education program by itself, prepared dedicated equipment for the program. Each BU conducts concentrated education programs by the dedicated instructors and realizes the HR development of the field service engineers to get there earlier.

5 Postscript

We introduced the facilities of the new engineering center and the main examples of its educational programs. Our products are operated as key facilities in support of social infrastructure. It is our responsibility to foster our field service engineers or technicians who support such infrastructure sys-

tems and know our supplied latest facilities as well as the aged facilities. Further, it is our duty that they acquire a wide range of maintenance techniques and respond to emergency cases of machine failures.

Going forward, we will continue to enhance

training and education programs and improve our research so that we can deliver “safe continuous operation and a peace of mind” to our customers.

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