

[New Course]

Regular Course on TPM Activities for Refinery Maintenance Management

1. Background and Objective

A marked generational change is taking place in oil-producing countries today, and is bringing to the surface issues in the operation of refineries and methods of handing on technologies to the next generation. Amid this situation, there is rising interest in TPM (Total Productive Maintenance/Management) activities, which were originally developed in Japan to modify employee consciousness. Since fiscal 2008, therefore, JCCP has been implementing customized TPM seminars in Saudi Arabia and Iran on a continuous basis, and organized a program in Japan last fiscal year for members from the Ministry of Oil-Iraq. Since then, to more closely respond to requests from oil-producing countries, a new regular course on TPM was included in the lineup of regular courses in fiscal 2013.

The course focused on addressing the issue of technological continuity that is of concern in oil-producing countries, and aimed to strengthen maintenance management technologies with a focus on onsite preventive maintenance, reliability and facility improvement by providing training in maintenance activities through autonomous maintenance and small-group activities in Japanese refineries. It was held over an 11-day period from January 14 to 24, 2014, with the objective of raising the awareness of refinery engineers who are responsible for operations and maintenance in the same manner as refinery equipment.

The participants were 18 engineers engaged in maintenance management at 15 organizations in 13 countries in the Middle East, Africa, West Asia, Asia and South America, and ranged in age from their 20s to 50s.

2. Program Overview

The course program was designed to provide a general understanding of TPM activities, shed light on the reality of TPM activities at oil companies that implement them, and provide training in the latest maintenance technologies at an engineering company,

maintenance company and equipment manufacturer. A problem-solving workshop was included in the program to summarize the main points of the course.

(1) General understanding and practice of TPM

- 1) Lecture on the introduction to TPM
Refinery safety management and maintenance management based on TPM activities
- 2) Hokkaido Joint Oil Stockpiling Co., Ltd., Hokkaido Office
Tank overhaul inspection, TPM activities
- 3) Idemitsu Kosan Co., Ltd., Chiba Refinery
Case examples of TPM activities and Kaizen activities for refinery management

(2) Latest inspection technologies

- 1) JGC Corporation, Yokohama Head Office
Latest inspection technologies and risk management
- 2) Sankyu Inc., Maintenance Center
The role of contractors and implementation framework and technology
- 3) Japan Steel Works, Ltd., Muroran Refinery
Manufacture of pressure vessels and the latest technologies

(3) Problem-solving workshop

- 1) Case studies and group discussion
“Workplace issues and solutions and action plans”
- 2) Presentation of the results of group discussions by each group

3. Results and Evaluation

(1) General understanding and practice of TPM

The lecture on the introduction to TPM defined TPM and explained its eight supporting elements in specific terms. Furthermore, to deepen understanding of the background to development of TPM, it aimed to provide a re-awareness of the importance of maintenance by introducing a serious accident that had occurred in the past at an oil complex in Japan. Emphasis was also



Lecture on the introduction to TPM

placed on the importance of managers in enhancing management and motivation in the workplace.

In the offsite training at Idemitsu Kosan, a general explanation was given of the objectives, history and effect of TPM activities implemented by the company, followed by a discussion of the process of initial cleanup and visualization in relation to autonomous maintenance activities, with a focus on achieving maintenance reform. A case example was also introduced of an activity to reduce malfunctions by changing the mechanical seal of rotary equipment, as a means for verifying the specific results and effect of such specialized maintenance.

The Hokkaido Office of Hokkaido Joint Oil Stockpiling Co., Ltd. has actively implemented TPM activities since its founding, and boasts a large number of awards. An actual walk-through of the office allowed the participants to observe the 5Ss applied to cabinets and desks in the office and to the field, where tools and service parts are sorted and organized in easy-to-

understand fashion. It is hoped that they will apply such TPM activities to their own workplaces after returning to their countries.

(2) Latest maintenance technologies

At JGC Corporation's Yokohama Head Office, a case example of a serious accident that had occurred at BP was introduced to explain the importance of OSHA and PSM in preventing such accidents, as well as the importance of risk management. The utilization of RBI to prevent risks was also introduced as a case example and explained in Q&A format. Additionally, an introduction of some of the latest technologies, including the Inspection Data Management System developed independently by JGC Corporation, its efforts to extend equipment life, and the thermal spraying technology that is expected to be utilized for equipment repair, and active questions and answers helped to deepen participants' understanding of maintenance.

At Sankyu Inc.'s Maintenance Center, a detailed presentation was given of the engineer development program that the company implements as a maintenance specialist to provide training individually geared to university graduates, vocational school graduates, and industrial high school graduates. The company's framework for training overseas maintenance managers was also introduced through a case example of the maintenance of rotary equipment, and gave a clear picture of the company's efforts to also develop local overseas employees. In the field, the participants gained first-hand knowledge of model facilities and material evaluation facilities used for training, as well as heavy machinery used in actual maintenance tasks, and the latest maintenance technologies.



Verification of the 5Ss in the office and plant



At the Japan Steel Works, Ltd., Muroran Plant



Problem-solving workshop

At the Japan Steel Works' Muroran Plant, an overview was given of the latest technologies developed independently by the company, including technologies for the manufacture of heavy oil hydrocracking units for the world's heavy oils and the latest pressure vessels used in nuclear power stations. Following the presentation, a tour was given of their manufacturing processes. In addition, the participants viewed a swordsmith performing the ancient Japanese sword-forging process, and gained exposure to Japan's advanced technology and technique. As a whole, the program at Muroran Plant provided a renewed awareness of the importance of material technologies and the understanding that process technologies are born from the thorough enforcement of the 5Ss in the actual workplace.

(3) Problem-solving workshop

A group discussion on "Workplace problems and countermeasures and action plans" was held as a form of practical training. Each participant presented a problem they had experienced and how they responded to it as a case study, and the other participants provided their input in a group discussion after gaining a shared understanding of the problems. More specifically, problems that were common to the entire group were

identified, and after reaching a common awareness of the desired state of affairs in regard to the problems that were selected, they analyzed why they are a problem, and what their causes may be. They then created an action plan for solving those problems, and gave a presentation on the last day of the course. In the general review of the course, the participants mentioned the workshop as having been particularly meaningful, raising expectations of their performance after returning to their countries.

4. Observations

Even prior to the course, the 18 participants had expressed their wish to incorporate TPM activities in some form at their workplace, while some participants also said they have already introduced TPM to their workplace. In any case, in the general review of the course, they more firmly reiterated their initial wish to make full use of TPM activities, and are expected to take action upon returning to their countries. Judging by the participants' evaluation, the course achieved its original goal, but further improvements will be made to make up for any shortfalls and continue implementing the course next fiscal year and onward.

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