Regular Course on Turnaround and Inspection (IT-3-14)

This course was designed intended for mechanical engineers with at least five years' experience in plant turnaround or maintenance in a refinery. It was implemented from January 13 to 23, 2015, with the participation of 10 participants from eight countries.

1. Course Overview

The course covered the stages of turnaround in a refinery, including its planning, implementation, evaluation and review. It placed particular focus on risk and reliability-based inspection and maintenance planning at the planning stage, on work process management at the implementation stage, and on optimization based on risk management methods at the evaluation and review stages. Furthermore, it aimed to provide general knowledge for improving maintenance management by focusing on reliability improvement of facilities and equipment improvement through the latest maintenance technologies, as well as preventive and predictive maintenance.

2. Training at JCCP

A lecture on "Outline of petroleum industry in Japan" described Japan's topographical features, demographic statistics, trends in demand for oil products, development of the oil industry, the share of petroleum in primary energies in Japan and transitional changes in that share, and refineries owned by oil distributors and other distributors in Japan and the present size of such distributors. It also provided knowledge of Japan's policies for energy security, including the status of crude oil stockpiling.

Next, a lecture on "Maintenance management and facility management technologies in the refinery" introduced actual examples of turnaround maintenance in relation to the organization of refineries, laws and regulations, and maintenance activities. It placed particular focus on introducing how methods for optimization of equipment management through risk-based inspection (RBI) and reliability-centered maintenance (RCM), which have been introduced to Japanese refineries in recent years, and equipment diagnosis for aged deterioration of devices are fully applied to the actual maintenance of a refinery that was built some 50 years ago.

3. Site Visits

(1) Non-destructive Inspection Co., Ltd.

The participants received a lecture on the latest inspection technologies and acquired hands-on inspection experience. The lecture covered technologies for the inspection of static equipment, tanks and pipes in a refinery, accompanied by a demonstration of four different inspection methods.

(2) Kobe Steel, Ltd., Takasago Equipment Plant

A lecture was given on the structure, performance and maintenance of the various types of compressors (reciprocating, screw, centrifugal) manufactured by Kobe Steel. A tour of the refinery site was also offered, and attracted the participants' strong interest with an inspection of compressors being manufactured or overhauled.

(3) Idemitsu Kosan Co., Ltd., Chiba Refinery

A lecture covered the refinery's organization and framework for maintenance, inspection and operations, inspection technologies, arrangements with repair contractors, objectives of regular maintenance and repair, and maintenance planning and schedules.

In the tour of the refinery, a seasoned operator in the instrument panel room explained the various items for turnaround and inspection in operations departments, such as the management of documents, the environment, work processes, safety and the worksite, with reference to actual inspection documents.

(4) Sankyu Inc., Maintenance Center

This lecture focused on the development of human resources related to maintenance, the implementation of turnaround maintenance in refineries, and the differences in plant maintenance between Japan and foreign countries. Also introduced were methods and systems

that strengthen employee motivation, such as long-term human resource development programs and positions and titles that are given according to skills levels.

(5) JGC Corporation, Yokohama Head Office

A lecture introduced the latest maintenance technologies and maintenance management with particular focus on information that is both necessary and useful to the participants, such as RCM (reliability-centered management), RBI (risk-based inspection), the A-MIS (advanced maintenance inspection support system) inspection management system, plan extension programs, metal spraying, and turnaround.

A demonstration of the A-MIS system captured the participants' interest by showing how inspection histories and the status of each part are displayed on device and pipe diagrams, and moreover how it allows inspection values to be input directly to the system through communication with inspection equipment.

Inspection demonstration at Non-destructive Inspection Co., Ltd.

4. Observations

Personnel who engage in maintenance in a refinery are generally extremely busy, so the short schedule of this course was appreciated by the participants. The course also provided a good variety of visits, namely to an inspection company, equipment manufacturer, refinery, maintenance company and engineering company, which appears to be worth continuing in the future.

It is hoped that the course, as a whole, provided information that will benefit the maintenance and inspection of aging refineries and oil facilities in oil-producing countries in the future.

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