

LNG-Engineering Training of Tokyo Gas

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1. INTRODUCTION

LNG, Liquefied Natural Gas, is currently recognized throughout the world as a clean energy source based on abundant natural gas reserves. In 1969, Tokyo Gas became the first company in Japan to begin receiving shipments of LNG. Ever since, we have over 35 years experience in operation, maintenance, technological development and engineering all about LNG receiving terminal. Besides, we have accumulated a huge amount of knowledge and know-how through the various efforts related to attain the stable and safe operation of the terminal and reduction of operation costs.

We, Tokyo Gas, have an actual achievement in operation without any fatal accidents and supply disruption in city gas business due to our accumulated knowledge and training policy for our own employees. In this background, we would like to share this knowledge and know-how to trainees from both domestic and overseas companies, also think our training program is absolutely useful for LNG technicians, operators and engineers.

2. TRAINING CURRICULUM

Training curriculum also provides a detailed description of the operational aspect from the characteristics of LNG to the maintenance activity, operation management and so on. Also focusing on the kind of skills and knowledge needed to handle low-temperature LNG. The program curriculum consists of instruction in a wide range of fields, including mechanicals, instrumentation, electricity, firefighting and much more.

Instructors are specialized engineers with many years experience of service at LNG receiving terminals, and explain all issues commenting on recent topics. Therefore, this curriculum is appropriate for the engineers or operators who start to be involved in the operation of receiving terminal, also appropriate who has the experience in energy industries such as oil and gas wishing to widen their understanding of the Liquefied Natural Gas.

Tokyo Gas normally arranges 10 days (two weeks) of the general training course (Program can be customized). The period seems a little long but it is at least necessary

for trainees who don't have enough chance to study "LNG".

2.1 Classroom lecture

To deepen understanding of not only the terminal operation but also LNG chain in the world, detailed explanation on LNG from upstream to downstream is prepared for the lecture on day one.

Whole areas associated with LNG are widely treated in our lecture. Lectures are generally carried out in the interactive learning environment using graphical contents with a lot of pictures. For example, procedure of withdrawing in-tank LNG pump from a storage tank for periodical maintenance will be explained by photograph; the scene of actual firefighting drill against LNG will be also introduced using several videos created in our own terminals. A textbook, which is provided in each course, will be useful for trainees to review their lessons after the training.

Lecture topics are including....

LNG Characteristic and Fundamentals; LNG Technologies; Gas Processing; Storage Tank; Vaporizer; BOG Compressor; In-tank Pumps; Piping and Valves; Welding and Corrosion; Daily Operation; Procedure of LNG receiving; Roll-over prevention; Instrumentation; Controls; Measurement for trading; Firefighting; Security Assurance; Quality Control; Performance Control; Cold Utilization and much more.

2.2 Terminal Tours

As the terminal tours allow trainees to obtain the actual experience in the real situation in LNG receiving terminal, our training program emphasizes on "lecture on the site of terminal," which is more effective in comparison to the classroom lecture. We allocate three whole days for terminal tours, and visit to Negishi, Sodegaura and Ohgishima terminals all located alongside of Tokyo bay. One of these days is scheduled to see with the arrival of an LNG carrier for first-hand observation of unloading work at jetty and berth. Training programs are adequately allocated to following two categories, and then make a detail explanation by instructors who just work in terminals.

1) Acquaint with whole LNG equipment knowledge in the terminal.

Trainees walk throughout our receiving terminals and observe the detailed feature of its operating equipments. Trainees can see not only mechanical equipments but also instrumentation and electrical equipments for two days tours, also see the dismantled equipments for the maintenance if available. Philosophy of maintenance management in Tokyo Gas will be introduced.

2) Acquaint with basic operation management in the terminal

Trainees will get a detailed explanation of key operation items, such as daily operation, inventory management, performance control and so on at the central

control room of Negishi terminal. Unloading procedure will be described at the jetty side while unloading. Trainees can observe and understand the real procedure when ship starts to unload. Observation of the unloading operation usually gets one of the highest reputations from trainees in the whole training program.

2.3 Training Center

In classes at the training center, trainees can experience training associated with operation and control. Training center has two Process Control Systems (PCS) for simulator training which has functions equivalent to the real PCS systems installed in LNG receiving terminals. Terminal operators in Tokyo Gas normally get training using these systems as "off the job training".

Trainee can directly touch the simulator of the PCS, and study the logic for operating major LNG equipments through the training curriculum. Control system for ORV or SCV is generally used for simulator training. This allows trainees to understand the key sequences such as start-up, load-up and shut-down. Also trainees can experience how the interlock works if the gas temperature flew from open-rack vaporizer is less than the set value.

There will also be instruction using lots of cross section models such as LNG pumps, low-temperature valves, tank relief valves etc. They are provided to give the trainees a correct understanding of the structure and principle of LNG equipments. Not only the mechanical equipments, trainees will be able to study instrumentation and safety equipments such as tank level gauges, flow meters, flame detectors and so on.

4. CONCLUSION

LNG training program and resources can provide in the wide range of LNG knowledge in response to the requirements of LNG industry. We have accepted lots of trainees so far from both domestic and overseas companies.

We convinced our training program will be extremely worthwhile for not only first-time operators or technicians but also experienced engineers in LNG terminals to get new and useful skills.