

## Feature II: Training LNG Carrier Seafarers

### Global Demand Expands for Natural Gas amid Shortage of LNG Carrier Seafarers

Demand is rapidly expanding for natural gas as an important green energy source to support our 21st century lives. Development projects are currently underway all around the world. Natural gas can be transported inland by pipelines or offshore by specialized vessels in the form of liquefied natural gas (LNG), the transport method for 30% of traded natural gas. By 2020, transport demand for LNG is expected to increase by 50% from current levels. To

support this demand, it is calculated that the number of LNG carriers worldwide will need to increase from less than 400 vessels at present to around 550. Although this is a major business opportunity for marine transport companies, there are concerns about a severe shortage of LNG carrier seafarers in the near future for the marine transport industry as a whole given the rapid rise in transport demand.

LNG is transported at a constant minus 162 degrees Celsius with a portion of it continuously vaporizing. Seafarers need to possess a high degree



# Investing in Human Capital

to Implement “STEER FOR 2020”

of technical skill to maintain the correct temperature and pressure inside the tanks of LNG carriers. To safely operate these LNG carriers, it is crucial to secure and train seafarers who possess specialized knowledge and experience.

An essential part of the stable energy supply chain depends on LNG carriers and the seafarers who operate them. With the world's largest fleet of LNG carriers, MOL is the company best positioned to fulfill this social duty and respond to rising demand. Under "STEER FOR 2020," the midterm management

plan currently being carried out, MOL is devoting attention to the LNG carrier business as a pillar of future growth strategies and is promoting concrete initiatives to train high-quality seafarers.

### **MOL's Initiatives Focus on LNG Carriers and Training Seafarers**

In line with the strategies outlined in "STEER FOR 2020," MOL is actively investing in building new LNG carriers while stably acquiring long-term LNG transport contracts. Of the less than 400 LNG carriers currently in operation around the world, 67 are fully or partially owned or operated by MOL. Including ships under construction, MOL boasts 92 LNG carriers as of March 31, 2015. This fleet is already the world's largest and will expand to 120 vessels by March 31, 2020. Our plan is to solidify our dominant rank as a leading company. The recruitment and training of LNG carrier seafarers are indispensable to implementing this plan. Succeeding in this effort is the key for MOL to seize solving social challenges as an opportunity to grow.

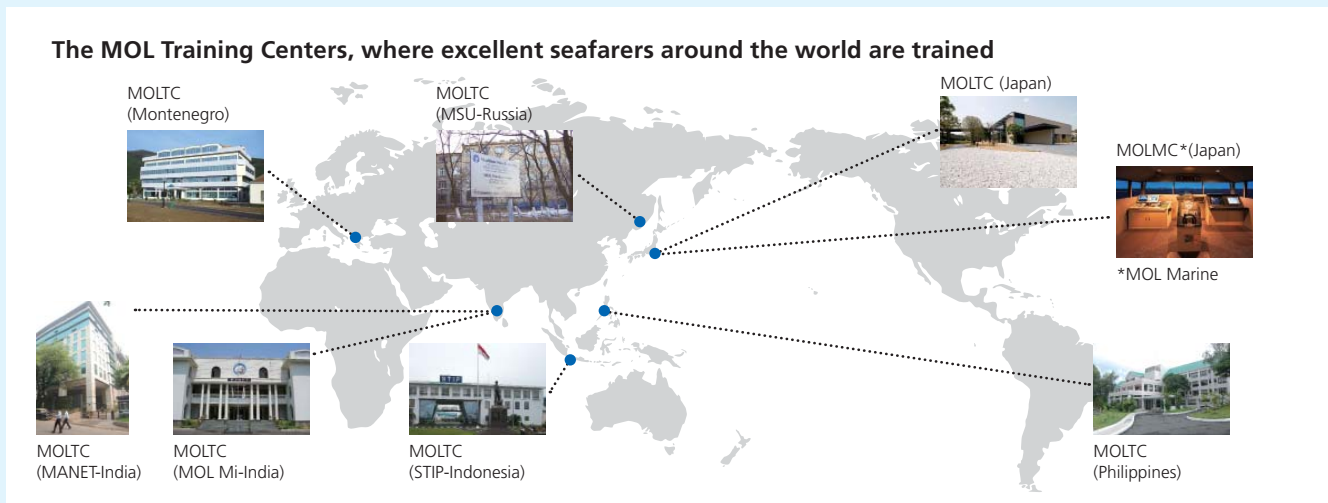
MOL has therefore been actively training LNG seafarers. We operate eight training centers in six countries worldwide. We also implement the Cadet Actual Deployment for Education with Tutorial (CADET) Training, wherein hands-on training is conducted aboard operated vessels. In addition to seafarers from Europe, a traditional source of LNG carrier seafarers, there are already 12 Indonesians aboard our LNG carriers as captains and chief engineers. MOL has a deep, long-lasting bond with Indonesia, which was the loading country when the Company entered the LNG carrier business in 1983.

Another method of securing LNG carrier seafarers is to provide specialized training to seafarers who already possess a wealth of experience on tankers or other vessel types, remaking them into LNG carrier seafarers. This is a strategy that the MOL Group is specially placed to carry out, owing to its many skilled seafarers and the world's largest diversified fleet.

Long-term practical training aboard LNG carriers is indispensable in both cases. In order to deploy trainees to existing LNG carriers, MOL is investing around ¥2.0 billion each year on LNG carrier seafarer training expenses for the duration of "STEER FOR 2020." We believe this is a necessary forward-looking investment to ensure the sustainable growth of MOL.



MOL operates MOL Training centers in eight locations spanning six countries and conducts a wide variety of training from lectures for learning theories to practical training using simulators and on operated vessels.



**Vessel Operation Simulator**

MOL employs an advanced onshore simulator, which perfectly recreates the bridge of a large vessel in operation. The highly functional vessel operation simulator is a cylinder 11 meters in diameter and provides a panoramic view of the ocean. The steering stand, control panel and radar used on the bridge are genuine articles. This system is run by about 50 high-speed computers, whose rapid processing power is capable of recreating any marine environment, and the 15 projectors on the ceiling generate life-like video. The captain and numerous seafarers, including deck officers, participate in training, polishing their technical skills and improving teamwork. In addition, this simulator is not only used for seafarer training, it is also used in our consulting business with municipal governments and port authorities mainly to design ports. In planning ports, we evaluate the safety of operating vessels by adjusting

the conditions in the port, including currents, waves and water depth. Before large bridges or other construction projects begin, we analyze the planned structure's profile and the blind spots or hazards that might result. This simulator features concentrated real-life experiences of seafarers. Not only does this smart simulator improve the skills of Group employees, it accumulates data while providing a wide range of services, turning the skills and knowhow cultivated into effective intellectual assets.



Training

Simulator

**MESSAGE**



Captain Andy Dwi Putranto

**Message for the Captain**

I decided to become a seafarer when I was in Elementary school. We call Indonesia "JAMRUD KATULISTIWA" ("Equatorial Emerald") because the islands lie like a necklace near the equator. I thought it would be beautiful to connect all the islands with a very long bridge, but my teacher said

that reaching other islands depended on using a "seaplane" or airplane. Since it could accommodate so many things and passengers in one trip, I thought the seaplane was more effective. I asked my teacher whether the seaplane could be "driven" by me. She smiled and said, "Of course, you can, but you have to study hard & enter Maritime School."

I was promoted to Captain in 2012, and my childhood dream came true. It was an amazing coincidence that the vessel's name was "Dwiputra," same as my name.

We have a good Training Center in STIP Jakarta, namely the MOL Training Center (MTC). We're proud of this because MOL is

one of only a few shipping companies which have a Training Center in Indonesia.

MOL's education and training programs are very useful because they always provide good materials such as training videos, books and magazines relating to ship safety, personal safety, the marine environment and crew orientation.

Since being promoted to Captain, I have been focusing on the safe behavior, health, knowledge and prosperity of my crew. A skilled crew is a big investment/asset of a shipping company. If the crew are happy and comfortable working on board, I believe that they will perform well, which is important for not only the safety of the ship but also the Company. Safe ship operations and the long life of the ship can only be maintained by a good crew. For LNG vessels, expert and skillful seafarers are absolutely needed considering the nature of the cargo.

Safe behavior on board is not only mandatory, it is our culture during life at sea. If safety on board is not implemented properly, it will negatively impact ship operation. On the other hand, fatal accidents, property loss, and environmental pollution can be avoided if safety is carved into the heart of every seafarer.

# Safe Operation

Safe operation is of the utmost importance and lies at the heart of MOL's management. In the midterm management plan "STEER FOR 2020," we set the reconstruction of our safe operating system as an integral initiative to strengthen our management foundation, which supports the successful execution of the plan. We will continue to restrengthen our safe operating system to ensure the thorough implementation of measures to prevent serious marine incidents as we strive to become the world leader in safe operation.

## Safe Operation Management

### Safe Operation Management Structure

MOL reorganized the division responsible for safe operation in February 2015. This move was aimed at integrating and horizontally disseminating information among different types of vessels while maintaining a structure that focuses on the front-line operation of every vessel type, reinforcing company-wide operational safety measures, and developing an organizational structure that focuses all the authority necessary to be responsible for the entire Group's safe vessel operations into the Marine Safety Division. Under the new structure, all land-based and ocean-going personnel are united to strive to maximize operating safety, with the goal of becoming the world leader in safe operation.

#### Organizational Structure Supporting Safe Operation



- Marine Safety Division
  - Ship management coordinating divisions
  - Marine technical teams supporting vessel operations for business divisions
  - In-house ship management companies leading working-level ship management \*

\*MOL Ship Management Co., Ltd., and MOL LNG Transport Co., Ltd.

### Emergency Response System

MOL continues to strengthen its systems so that it can provide an accurate response in the unlikely event of an emergency.

### Safety Operation Supporting Center (SOSC)

The SOSC is staffed at all times by two marine technical specialists, including an experienced MOL captain, and supports the safe navigation of MOL-operated vessels around the clock 365 days a year.



Safety Operation Supporting Center (SOSC)

The center monitors the position and movement of more than 900 MOL Group-affiliated vessels in real time, providing assistance from the captain's perspective by supplying information on abnormal weather and tsunamis and on piracy and terrorism incidents to relevant personnel on the ship and land. At the same time as serving as an information portal supporting the safe

operation of MOL ships, the center also functions as a help desk for urgent inquiries from ships regarding safe operation. Since its establishment, the center has helped to steadily reduce the number of incidents involving adverse weather or emergency entry\*1.

For detailed SOSC information, see the Safety, Environmental and Social Report.



### Accident Response Drills

MOL regularly conducts accident response drills on vessels while at sea. These drills simulate various situations such as an on-board fire or water immersion, or act of piracy or terrorism, so that seafarers can respond swiftly and appropriately in an emergency.



Evacuation drill on board

Head Office conducts serious marine incident emergency response drills twice a year with the cooperation of the Regional Coast Guard Headquarters. The drills involve MOL's President, other corporate officers, representatives of relevant departments and ship management companies, and vessels. In October 2014, we conducted an emergency response drill based on the premise of a collision of our product tanker while underway in Galveston Bay. In May 2015, we conducted an emergency response drill based on the premise of our cruise ship colliding with a containership while under way on the Kanmon passage. Furthermore, MOL Group companies that operate ferries and cruise ships conduct emergency response drills, including evacuation guidance, on a regular basis, as they put the highest priority on ensuring customer safety in an emergency.

### Safe Operation Measures

Efforts to ensure safe operation will never end. Coupled with the revision and continuation of policies already in place to strengthen safe operation, MOL will thoroughly implement policies to prevent a recurrence of recent serious marine incidents.

### Making Processes for Realizing Safe Operation Visible

MOL has introduced objective numerical indicators for measuring safety levels, and also set the following numerical targets, including the Four Zeroes.

1. Four Zeroes (an unblemished record in terms of serious marine incidents, oil pollution, fatal accidents and cargo damage)
  2. LTIF \*2 (Lost Time Injury Frequency): 0.25 or below
  3. Operational stoppage time \*3: 24 hours/ship or below
  4. Operational stoppage accident rate \*4: 1.0/ship or below
- In fiscal 2014, MOL worked on three important targets:
- (1) eradicate work-related accidents causing death, and reduce work-related accidents causing injury,

- (2) eradicate collisions and groundings, and
- (3) eradicate machinery trouble resulting in a dead ship condition (a ship being unable to move under its own power).

**Preventing New or a Recurrence of Serious Incidents**

MOL is constantly, repeatedly implementing and raising awareness of fundamental matters while striving to thoroughly keep fresh the memory of serious incidents we have experienced and prevent a recurrence of serious incidents while giving due consideration to improving teamwork, safety awareness, awareness of relevant parties and vessel management quality. We will continue to adapt our accident prevention system by making improvements related to both seafarer training and ship facilities to break the chain of errors in which minor factors combine and ultimately lead to major maritime accidents.

In terms of seafarer training, we are thoroughly implementing drills prior to boarding and supervising the instruction of less experienced seafarers. We are also enhancing land-based education and training curriculum and programs such as "Hazard experience" training sessions and BRM drills\*5. These measures are geared towards enhancing the ability of seafarers to perceive danger and promoting teamwork. In addition, we are working to raise safety awareness among seafarers by collecting information from each vessel in operation on examples of incidents and problems as well as close calls\*6 and by using videos, photos and illustrations to appeal to the visual sense of seafarers. In terms of ship facilities, we are working to equip ships with error-resistant equipment and promoting the adoption of information technology. This involves promoting the fail-safe design concept by providing shipyards and equipment manufacturers with feedback from vessels in operation on areas of non-conformance and areas in need of improvement.

It is the MOL Group's ultimate goal to eradicate work-related accidents causing death. MOL analyzes the factors and causes behind accidents from various angles and uses the results to make improvements in ship facilities. It also asks employees on land and at sea to discuss and propose preventive measures for examples of serious incidents and problems as if they were each wholly responsible as part of efforts to prevent accidents.

**Cooperation for Safe Operation**

The MOL Group works together with vessels, shipowners, and

ship management companies to work toward achieving the world's highest level of safe operation of all owned and chartered vessels by sharing safety-related information. The Company regularly broadcasts "Safety Alerts"—information pertaining to safe operation, including work-related incidents involving casualties—to every vessel. MOL conducts "Safety Operation Meetings" and "Safety Campaigns" involving vessels, shipowners, ship management companies and even the sales division to deepen understanding of its safety standards and to discuss safety improvements. MOL also inspects vessels to check whether its safety standards are understood well and put into effect. If there is a need to make improvements, MOL will take corrective actions, communicating with the vessel, shipowner and ship management company in the process.

For detailed safe operation, see the Safety, Environmental and Social Report.



**Third party evaluations**

**Safe Operation, Including Evaluations of Seafarer Educational Programs**

**LNG Carrier Standard Training Course acquired certification from DNV\*\***

The LNG Carrier Standard Training Course implemented globally by MOL was certified by Norway's Det Norske Veritas AS (DNV)\*\* in 2007 for compliance with the LNG carrier crew ability standards advocated by SIGTTO.\*\*\*

\*\* Now DNV GL AS

\*\*\* Society of International Gas Tanker & Terminal Operators Ltd.

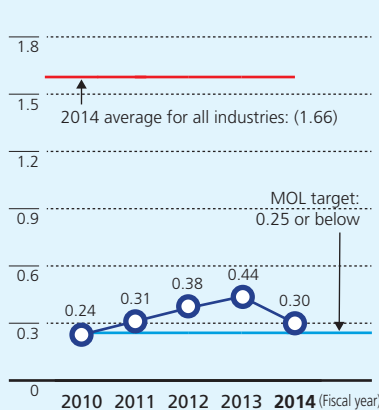


**Management program for seafarer education and training acquired certification from DNV\*\***

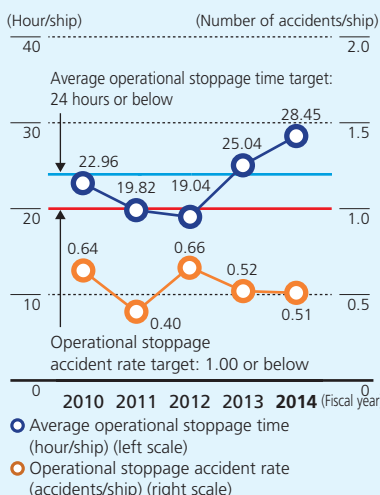
MOL's management program for seafarer education and training was recognized to be effective and certified in its tanker and LNG carrier operations by DNV\*\* in 2012 for compliance with the Competence Management System (CMS).



**Lost Time Injury Frequency (LTIF)**



**Operational Stoppage Accidents Average Time and Frequency**



**Glossary**

- \*1 **Emergency entry:** Entering foreign territory due to severe weather on the sea, serious hull or engine distress, or the injury of a crew member.
- \*2 **LTIF (Lost time injury frequency):** Number of work-related accidents per one million hours worked that resulted in time lost from work of one day or more. Average for all industries (2014) was 1.66; for shipping industry, 1.33; for transportation equipment manufacturing industry, 0.51. (Source: 2014 Survey on Industrial Accidents issued by the Ministry of Health, Labour and Welfare)
- \*3 **Operational stoppage time:** Expresses the amount of ship operational stoppage time due to an accident per ship per year.
- \*4 **Operational stoppage accident rate:** Expresses the number of accidents that result in ship operational stoppage per ship per year.
- \*5 **Bridge resource management drill:** Simulating an incident on a vessel operation simulator to enable seafarers to acquire response techniques. It includes MOL's original programs.
- \*6 **Close calls:** Risky incidents that came very close to causing a more serious accident.