The Role of Training Ship in TUMM

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1 Introduction

Japanese seafarer's education system in the university and maritime colleges belonging to the ministry of science and education, has peculiar system for gaining a seafarer's certificate. In order to gain a third officer's license, the students must take one year's onboard training in the National Institute of Sea Training of the Independent Administrative Institution (KOUKAI KUNRENSHO). The National Institute for Sea Training (KOKAI KUNRENSHO) has own large training ships including famous sail training ships Nippon Maru and Kaiwo Maru.

Besides of these training ships, the universities and the maritime colleges has an own 400 gross tonnage class of training ship. Tokyo University of Mercantile Marine (TUMM) has also T.S.Shioji Maru the Third. This ship was built in 1987 for training and researching in our university.

In this paper, we introduce the role of the training ship SHIOJI MARU in education and also researching.

2 SHIOJI MARU The Third

Fig. 1 shows a general arrangement of Shioji Maru the Third, Table 1 shows the principal dimensions of this ship. Besides of a rudder and a CPP, this ship is installed with a bow and a stern thrusters for controlling the ship's attitudes.

Fig.1 Shioji Maru The Third and Its General Arrangement
<table>
<thead>
<tr>
<th>Item</th>
<th>Dimension</th>
<th>Item</th>
<th>Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>49.9m</td>
<td>Propeller</td>
<td>4 blades CPP</td>
</tr>
<tr>
<td>Breadth</td>
<td>10.0 m</td>
<td>M/E</td>
<td>Diesel</td>
</tr>
<tr>
<td>depth</td>
<td>3.00</td>
<td>Bow Thruster</td>
<td>2.4 tons</td>
</tr>
<tr>
<td>Gross tonnage</td>
<td>425 tons</td>
<td>Stern Thruster</td>
<td>1.8 tons</td>
</tr>
<tr>
<td>Displacement</td>
<td>785 tons</td>
<td>Speed</td>
<td>14.1 knots</td>
</tr>
<tr>
<td>Cb</td>
<td>0.555(Full)</td>
<td>Crews/Cadets</td>
<td>62(7crews)</td>
</tr>
</tbody>
</table>

Table.1 Principal Dimensions of T.S. Shioji Maru

This ship has very excellent data acquisition system using a local area network system (LAN) shown in Fig.2.

Fig.2 Local Area Network System for Ship's Data Acquisition

3 Education on board

The training period of navigation and engine course are 3 days in the third and fourth glade, respectively. The main voyage area are outside of Tokyo Bay and near the Izu islands.

Curriculum of Navigation Course

Besides of the ordinary navigation watch training and the fire station discipline, the students are imposed on the following actual on-board tests and analysis. And they must submit the report about these experiments in the ship

>> Zig-zag test: to gain the maneuvering index (Fig.3)

>> Spiral test: to examine the course stability (Fig.4)

>> Turning test: to examine the basic maneuvering characteristic (Fig.5)
>> Backing test: to the stopping ability
>> Fuel oil consumption: to examine the basic performance of the ship

4 Other universities education
Shioji Maru is used for sea experience of the students in the departments of naval architecture of YOKOHAMA National University and University of Tokyo. They navigates for 2 days before a summer vacation associated with each university.

5 Researching of Under Graduate, Master and Doctor courses
The students of university in the undergraduate must write a thesis before graduating. Some students including the foreign ones use the summer voyage of the ship for completing their thesis. They can freely access the computer system in the laboratory to obtain the ship data and control the ship using the rudder and propeller and two thrusters.

6 Researching
Researching is another important role of Shioji Maru. Our university has long histories of the researches using the ship. Their researches are carried out as independent research in our university or cooperative one with other organizations including the government institutes and private maritime companies.
Main results are as follows:
Co-research works with governmental organizations and private companies
>> Developing of Various Types of Autopilot Systems including Roll Reducible one
>> Automatic berthing experiments which was the first experiment in the world
1989. This project 'The Development of Integrated Intelligent Ship' was initiated with the ministry of transportation and our university. See Fig. 6.

The project for making the IMO maneuvering standard booklet (1987)

The project for making the IMO seakeeping standard about the capsizing in following sea (1998-2000)

New Type of Onboard Wave Observer System. See Fig. 7


Development of Wind Vane Type of Dynamic Positioning System (with Delft University) (1999). See Fig. 8

Development of New Type of Computerized Guidance and Control System (with Norwegian Institute of Technology) (2000-) See Fig. 9

Development of New Position System using RTK-GPS in Tokyo Bay. See Fig. 10.

Development of Satellite Communication system between Shore and Ship including Image Processing Data with the NASDA (2002-)

Development of Stable Artificial Horizontal Plane (2001-)

Main Doctoral Thesis

The development of minimum Time Berthing System

The Development of New Type of Engine Governor System

The New Types of Automatic Guidance and Control System using a modern control theory

The Development of Collision Avoidance System using Neural Network Theory
7 Conclusion and Remark

In this paper, we discussed about the role of our educational and research ship Shioji Maru. We can conclude that such small type of training ship is important not only as student's training but also as research ship. Shioji Maru is open to all students and researchers including the foreigner who are interesting in maritime research and education fields. See Photo.2

Photo.2  Sea Training by Cadets