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EVALUATION OF THE PROFESSIONAL PREPARATION OF STUDENTS IN ASPECT OF GOING THROUGH AN INDIVIDUAL APPRENTICESHIP AT SEA

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Summary: The basis of the curriculum of the Faculty of Marine Engineering at Marine University in Szczecin has been presented in the paper. Basing on the years of professional experience of the author acquired on the merchant marine ships, readiness of students of Marine Academies to the individual practice at sea has been evaluated. The possibility of improvement of the level of professional preparation of students, in a perspective graduates of the Maritime University has been presented.

Keywords: professional experience, seamanship, laboratories, workshop, tools, engine room equipment and mechanisms

Introduction

The educational process conducted by maritime universities is in compliance with the International Convention on Standards of Training, Certification and Watchkeeping issued in 1978. In 1995 many changes and updates were introduced to the convention. Since that time on the convention has been referred to as STCW 78/95. The teaching program of the Marine Engineering Faculty at the Maritime University of Szczecin is also in compliance with STCW convention [1] both at daily full time regular [2, 3, 4], and part time (*extramural*) studies [5]. The programs, approved by the Council of the Marine Engineering Faculty, explicitly specify names of the subjects, number of teaching hours students of particular directions should attend. At the same time the ratio between theoretical subjects like lectures, seminars, presentations and practical classes like workshops, laboratories and simulators has been clearly defined. Apart from that, it was specified how long student practice on board merchant vessels to be taken up by the Maritime University of Szczecin students during their studies should last. It needs to be emphasized that the Maritime University does not take any responsibility for vessels' equipment or the educational level and experience of ships' crews, which during the apprenticeship time take the liability for the students' supervision and practical training. The 3rd year students of the Faculty of Marine Engineering usually occupy the positions of junior motormen on vessels that belong to Polish ship owners, or engine cadets on board foreign ship owners' vessels. These positions do not impose on them any liability for machinery and engine room equipment, however, the moment they sign on, they become independent crew members.

Assessment of student preparation for the performance of independent onboard training

Sailing on board merchant vessels as a Chief Engineer, the author of the paper could supervise the work of cadets from Poland, Slovakia, Germany, Philippines and Ethiopia. The cadets were recruited in order to complete the vessels' crews and therefore they were signed on one by one, not in groups, which is a routine for training vessels. They came from different educational backgrounds, which

means that some of them managed to complete only post-primary technical schools enabling them to start working on board vessels at the lowest stage of the career ladder regarding responsibility and duties, mainly due to the fact that they took up the job in the engine room department.

However, in most cases they were students of higher education institutions teaching future officers of the merchant fleets. It is worth mentioning that for most of the assessed cadets it was their first independent voyage within their full employment, however, performed during the process of their education. The voyage is also mandatory because of STCW requirements in order to get a university diploma. The paper presets the assessment of the representatives of the group of Marine Engineering Faculty cadets-apprentices from the Polish Maritime Universities. It needs to be emphasized that at this stage the theoretical knowledge of the employed cadets is not evaluated. This task was left to the schools and universities, which had prepared their students and graduates. These are just educational centres that are responsible for executing the right level of their students' education. Determining the level of their preparation is based on the collected signatures and passed exams in particular subjects in compliance with STCW.

On board merchant vessels there are also cadets, for whom it is their next voyage (*in most cases the second one*) after graduating from maritime schools. In this group some of the cadets had their mandatory on board training completed, which is required by the maritime administration to confer the diploma of a watchkeeping engineer. In case of meeting all the criteria specified by an employee (*a ship owner),* it meant the possibility of employment as a watchkeeping engineer. The verification involves the assessment conducted by the Chief Engineer whether the selected aspects of work in the engine room are met by the assessed cadet.

Process of assesment of students' practical preparation

The assessment of engine cadets' actions consisted of daily observations based on their duties related to the operation of engine room equipment. Due to the higher level of education the cadets were assigned to work in direct attendance with watchkeeping engineers when handling equipment and conducting repairs carried out in the engine room. The performed work was assessed in the two following stages:

THE FIRST STAGE – 'PREPARATORY WORKS'

- prior checking of the technical documentation of a repaired device;
- preliminary analysis of different causes of a possible damage;
- specifying and preparing necessary spare parts indispensable to carry out a repair of an overhauled / damaged device;
- specifying and preparing necessary tools;
- preparing the engine room systems, whose setting changes are required to carry out repairs of an overhauled / damaged device;
- analysis of the impact of changes in nominal settings of the systems on the work of other engine room equipment.

THE SECOND STAGE – 'MAINTENANCE AND FINISHING THE WORK'

- proper selection of spare parts;
- use of the prepared tools;
- cleanliness of the work station;
- restoration of the output settings and configuration of marine systems;
- testing the repaired device before restarting the service;

A sample test: 'Exchange of the sealing of an auxiliary engine pre-lubricating pump'. The engine construction diagram was presented in Fig.1, where the following data were outlined: the damaged pump with its drive (3), oil suction pipe inside the engine (1), oil suction pipe outside the engine (2), oil dump discharge pipe with shut off valve (4).

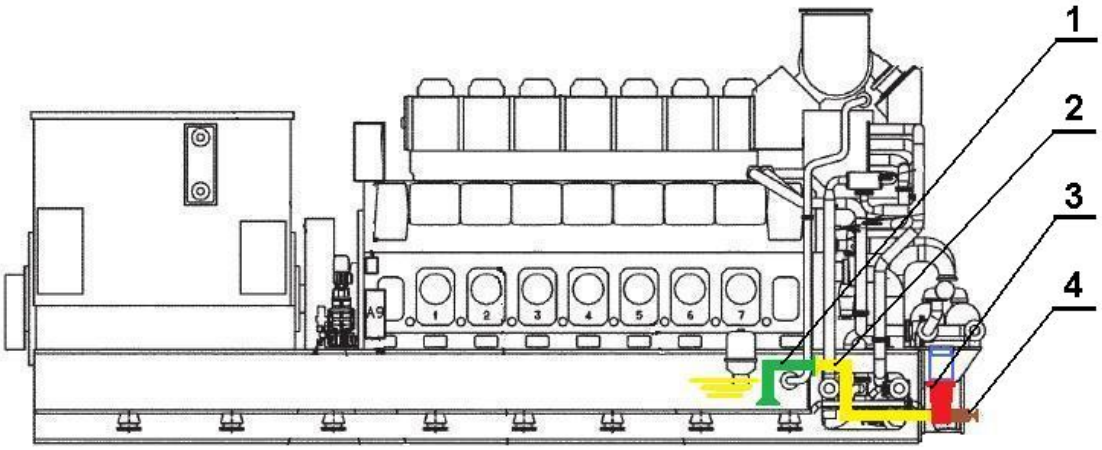

Fig.1. Simplified diagram of an auxiliary engine

Assesment results

The first stage 'Preparatory works' assessment showed lack of preparation for carrying out works in a marine power plant even on a position of a 'handyman's assistant' of a watch engineer. In many cases cadets were not able to find the proper technical documentation for the conducted works. In some cases they could not read with comprehension texts in English, which is a standard language for world marine publications and onboard communication. Due to the problems with understanding technical documentation, students on their own, without help, neither were able to define the needed spare parts nor prepare the necessary tools. Appalling proved their carelessness when they were trying to change marine systems settings (*e.g. switching off pumps servicing branched systems such as cooling or lubricating, cutting off branched lines of steam systems*).

The assessment of the second stage: 'Repair and finishing the works' was significantly influenced by the results of the first stage assessment. The cadets without constant supervision were not capable of making proper use of both the tools and spare parts earlier prepared by the watchkeeping engineers. Also they did have problems with keeping their work stations tidy (*e.g. removing oil and fuel stains, collecting used wipers and cloths in designated places, organization of the used tools*).

A sample test: the result of the test was clearly negative, although the cadets participating in the ongoing work were on board at least for a few weeks. Apart from the above mentioned problems, it turned out that the cadets had problems with the application of the theoretical knowledge (*in this case, on connected vessels*), which eventually resulted in the loss of a few dozens to a few hundreds litres of lubricating oil. Communication with other persons responsible for the security of other than typical mechanical elements (*locks and electrical stops*) also failed.

Improving the practical education of students - shipowner facilities and training systems on the sea going vessels

In spite of the fact that Maritime Universities possess their training vessels on board which students of marine engineering faculties have opportunity to get familiar with some elements of marine power plant equipment, the carried out observations proved that a considerable part of the onboard practice concerning a cadet's position is again devoted to getting to know basic elements of marine power plant and the principles of its safe operation. Thus, there appears the question: 'How to better prepare students to undergo their seamanship training?'. An answer to the question seems a possibility of signing cadets – apprentices on merchant vessels which are specially prepared for that purpose.

Some ship owners have already decided to participate in trainings of their future staff officers at the initial stage of their education. For example, such companies like COSCO, Shell, Dole, Hamburg Süd, which on their vessels meant for shipping cargo managed by

the owners or the charterers, have decided to introduce modifications enabling to embark not just one or two apprentices on cadet position, but a group of up to over ten people. It is worth mentioning that the vessels, on board which such enlarged groups of trainees were admitted, were not adjusted to fulfil their additional role after they were brought into service, but already on the preliminary stage of their designing the need for providing accommodation for a whole group of additional crew members was taken into consideration. It is also worth remembering that, in case of such a numerous group of trainees, the regular crew, whose duty is to maintain the smooth and safe operation of the ship, is not able to provide adequate supervision of trainees whose inexperience and lack of knowledge of the specifics of work in marine conditions greatly increases the risk of accidents. Therefore, it seems indispensable to provide additional cabin space in the structure of the superstructure for an instructor conducting the training, whose marine qualifications are confirmed by his officer's diploma. At the same time it is most essential to provide the signed on cadets with the possibility of undisturbed and, most importantly, safe [6] access to gain marine experience in the following areas:

- familiarization with occupational safety principles in maritime conditions;
- learning the principles of proper use of protective clothing (*overalls, safety gloves, protective boots and goggles…)*
- the use of appropriate chemicals to maintain the hygiene and cleanliness in the engine room;
- the preparation and use of standard and specialist tools;
- getting familiar with the engine room systems, their location and most of all the appearance of particular elements making up the whole systems on real merchant vessels.

Basic tasks and activities referring to the marine engine room can be successfully carried out under the supervision of an instructor in special workshops of manual and mechanical treatment (Fig. 2).

Fig.2. Training workshop of manual and mechanical treatment [source: picture taken by author]

For this type of ships a great convenience are specially upgraded rooms to learn welding. A very important aspect is the extension of this workshop so that at the same time a few people can work freely (Fig. 3). Almost without limitation cadets can test their theoretical knowledge of welding, using different materials and welding techniques to produce simple components used during repair work by the crew. Despite the significant facilities which are separate welding and machining and manual workshops, it is important to enable the conduct of introductory classes prior to the workshop and repair work. Previously presented typical

Fig.3. Training welding workshop [source: picture taken by author]

engine room spaces, despite their adaptation providing easy access to tools and devices for groups of trainees, unfortunately, do not meet the conditions for conducting this type of classes. That is why the above mentioned ship owners also took care of the separation of the well equipped class rooms in the ship's superstructure which enable lecturers to a dozen or so groups of listeners (Fig. 4). Such a class room is equipped with computers and multimedia devices that can be used to teach about any content, which makes it a universal space available, if needed, for apprentices from both departments mechanical, electrical, as well as navigational.

Fig.4. Lecture hall for trainees [source: picture taken by author]

Conclusions

Students on their first voyage, employed as engine cadets, in the vast majority of cases, were not able to identify a number of basic marine engine room devices. Some were not able to distinguish the main propulsion engine driven by a fixed pitch propeller from auxiliary engines driving generators.

Despite the high level of education regarding the theory, the cadets were often not able to use the previously acquired knowledge. Often a considerable period of seamanship practice is lost for re-familiarization with the basic equipment and engine room mechanisms and tools. Unfortunately, crew members due to the need of conducting works related to the ship's operation and supervision of the carried cargo are not able to devote more time and attention to inexperienced cadets.

Some owners have decided to adjust some of their vessels for the purpose of training their future staff officers. These vessels during their construction process have been fitted with additional living quarters, workshops and lecture halls enabling to sign on groups of a few or more than a dozen cadets. These are vessels used for standard carriage of cargo, which under real conditions is operated by a ship owner or charterer. Embarking trainees on ships of this type in order to undergo at least part of the required onboard training considerably helped them to get acquainted with the system and the specifics of the work at sea.

Enabling more Maritime University students to take onboard training on such ships would be really beneficial. This would significantly raise their level of preparation for the practical use of their acquired knowledge.

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