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NOISE ONBOARD FT MODULE CARRIER VESSEL

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ABSTRACT

Regarding the latest MEPC requirements, the noise levels onboard ships is mandatory to be limited as levels under the maximum acceptable values. In this task the designers, shipbuilders, owners and others acting in this industry should be involved. In the last years the hybrid propulsion system has been implemented onboard more and more ships. What is the influence of this arrangement on crew and passengers onboard ships, is good or not?
The paper presents the noise levels onboard a vessel having hybrid propulsion system (diesel-electric).

Keywords: MEPC, *Code on noise levels onboard ships*, hybrid propulsion system, better life conditions onboard vessels

1. INTRODUCTION

The necessity of increasing of safety and comfort for seafarers and passengers onboard vessels, were emphasized in a new CODE ON NOISE LEVELS ONBOARD SHIP, MSC 337(91) [1] which supersedes the Resolution A 468 (XII). Marine Safety Committee used this new Code to decrease the maximum acceptable noise with 5 dB for bigger ships, in some spaces, beginning with July 2014, but only for new ships. This is a clear signal launched by Marine Environment Protection Committee (MEPC) the noise protection still remain a purpose for a better life for seafarers onboard ships.
A lot of authors showed the bad influences of higher noise levels on humans. On board ships are two main noise sources: main engines and propellers. In addition, other secondary sources (diesel-generators, pumps, compressors, fans etc…) can increase these levels. In case of a hybrid propulsion system the main engines are also diesel-generators.

Having in mind the above considerations, the designers, owners, charterers and ship's operators are forced to adopt measures to limit the noise levels onboard ships.

2. FLAT TOP MODULE CARRIER VESSEL

This type of ship has been built to transport heavy cargo in shallow waters, according to Marshall Islands flag. The cargo (modules) are 66m x 21m (height) x 23m (breadth). The ship was arranged as a single decker; machinery and accommodation were/are arranged forward. Propulsion (hybrid type) has two azimuth propellers aft.
The vessel primary activities are the transport of pre-assembled modules (deck cargo).

MAIN PARTICULARS:
Hull:
- length overall approx. 113.2 m;
- length between p.p. approx. 108.5 m;
- breadth moulded approx. 21.0 m;

- breadth overall approx. 21.2 m;
- depth main deck moulded approx. 6.5 m;
- max. draft (summer load line) approx.4.0 m;
- scantling draft approx. 4.0 m.

Machinery:

- 3 main diesel engines 940 ekW / 1800 rpm fuelled with marine gas oil (MGO);
- 2 azimuth propellers each driven by an electric motors.

3. TRIALS CONDITIONS

The measurements have been performed on the Black Sea, in sea trials (transit conditions) during endurance test and unattended machinery space.

Transit conditions means:

- two or more main engines running;
- speed above 10 knots;
- two main propeller running.

Weather conditions:

- sea: 2^{O};
- wind: 3^{O}.

Water depth has been more than 5 times under keel draughts (about 30 m).

PS WHEELHOUSE	Bridge		60.2	65
CL WHEELHOUSE	Bridge		62.0	65
STB WHEELHOUSE	Bridge		59.7	65
1 CREW	A		50.4	60
1 CREW	A		46.7	60
1 CREW	A		52.9	60
CHIEF ENG. - DAYROOM	A		48.1	60
OFFICER	A		48.6	60
CHIEF OFF. - DAYROOM	A		49.0	60
CAPTAIN - DAYROOM	A		49.3	60
1 CREW	A		48.5	60
CAPTAIN - BEDROOM	A		50.3	60
CHIEF OFF. - BEDROOM	A		48.6	60
CHIEF ENG. - BEDROOM	A		49.4	60
2 PASSENGERS	A		51.7	60
1 CREW	A		56.6	60
1 CREW	A		57.2	60
1 CREW	A		58.1	60
SERVER ROOM	A		66.0	85
A/C ROOM	A		77.3	85
EMERGENCY GEN. ROOM	Main Deck		73.8	110
1 CREW	Main Deck		46.8	60

Fig. 2 Measurements results

Fig. 1 Ship's profile

1 CREW	Main Deck		47.9	60
1 CREW	Main Deck		49.3	60
DAYROOM	Main Deck		48.3	65
MESSROOM	Main Deck		61.4	65
GALLEY	Main Deck		64.5	75
WASHING ROOM	Main Deck		62.6	85
LINEN	Main Deck		62.5	85
LAUNDRY	Main Deck		63.9	85
ECR	Main Deck		63.1	75
CHANGE ROOM	Main Deck		67.6	85
DECK WORKSHOP	Main Deck		74.1	85
2 PASSENGERS	Main Deck		57.1	60
PS AFT PROPULSION ROOM	Tank Top		99.1	110
CL AFT PROPULSION ROOM	Tank Top		98.8	110
STB AFT PROPULSION ROOM	Tank Top		100.5	110
DGS COMPARTMENT (AFT IN PS)	Tank Top		109.1	110
DGS COMPARTMENT (FORE IN STB)	Tank Top		108.5	110
SWITCHBOARD	Tank Top		72.8	85
SEAWAGE TREATMENT ROOM	Tank Top		78.1	85
E/R WORKSHOP	Tank Top		74.6	85
FORWARD BOWTHRUSTER ROOM	Tank Top		99.1	110

Fig. 3 Measurements results (continue)

In the above **Fig. 2** and **3** are shown the results in sea trials (first column with values) and permissive values (second column with values) according to SOLAS Ch. II-1, Reg. 3-12 Noise Code MSC. 337(91): CODE ON NOISE LEVELS ONBOARD SHIPS.

The location of the measuring points is shown in Fig. 4…8, below:

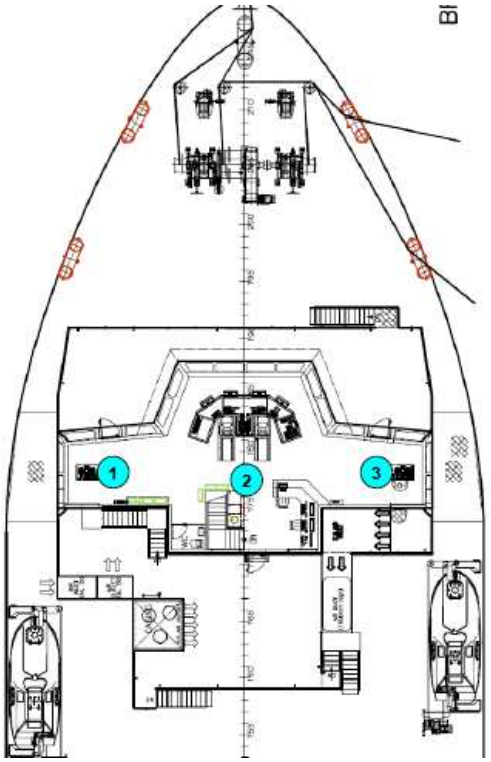

Fig. 4 BRIDGE Deck

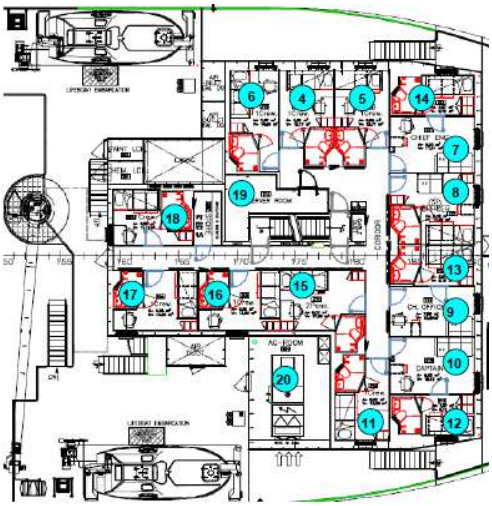

Fig. 5 A Deck

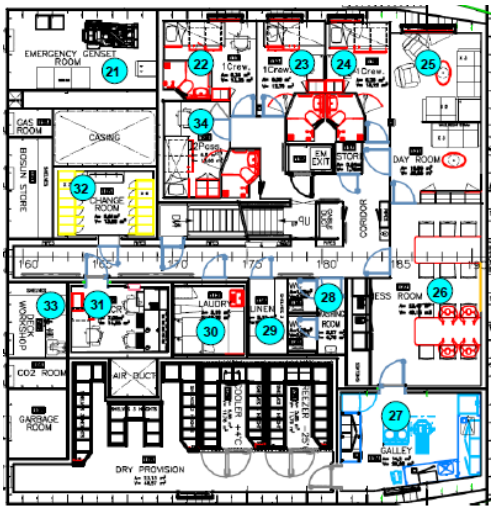

Fig. 6 Main Deck

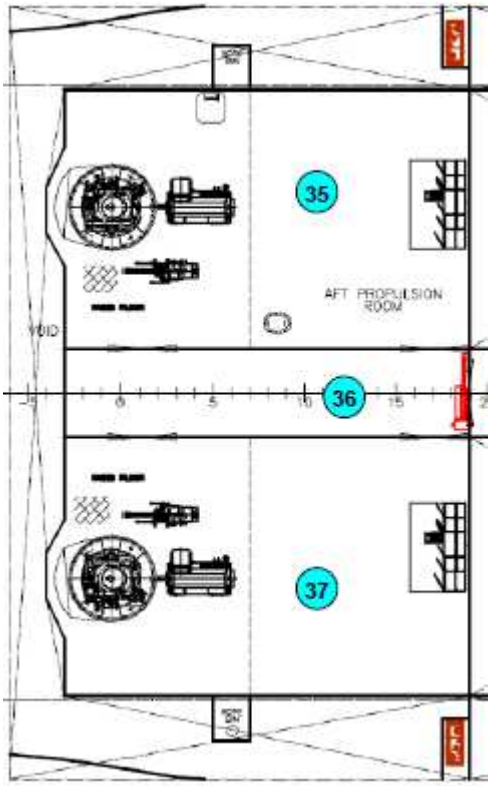

Fig. 7 TANK TOP - Propulsion Room

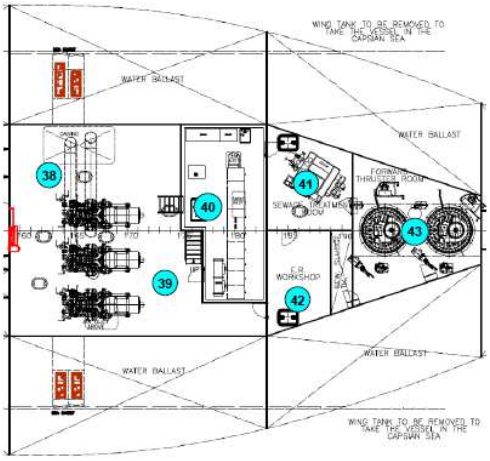

Fig. 8 TANK TOP - Engine Room

The measurements have been performed with a 2250 Brüel & Kjaer sound level meter. Before and after measurements, the instruments have been calibrated with a NC-74 acoustic calibrator, having a valid certificate.

4. CONCLUDING REMARKS

The improvement of the work and living conditions on board ships for seafarers also for passengers became an important task in maritime transport, both for designers, shipbuilders, owners, charterers etc… The legislation on sea and ports related to pollution, in any form, is more and more updated in order to reduce the emissions, all for a cleaner and friendly environment.

According to **Fig. 2** and **3**, the life conditions onboard this type of ship are very good, from the noise point of view. The measured levels are far away under permissive values, especially in the resting cabins but also in working points. These conditions are so good due to the hybrid propulsion system of ship which offered the possibility to move the accommodations in fore side of the vessel. In this manner one main noise source, the propellers, are located in aft side of ship far away from crew resting cabins and the accommodation are in fore side.

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