

ASEF #6 Guangzhou, China

Notes by Session Host on 2nd Session - Environment & Security

The session discussed three key topics of environmental protection, namely GHG, BWMS, and Air Pollution, consisting 8 presentations.

GHG

1. Technical issues of EEDI regulation to be clarified by shipbuilders – hydrodynamics point of view – (by Tsuyoshi ISHIGURO, IHIMU)

The presentation was focused on the outcome of the discussion at IMO MEPC64 on the EEDI regulation, and the remaining issues to be dealt with by SAJ:

- (1) Procedure and conduct of the sea trials being decided to adopt the STA method as was recommended by ITTC PSS unjustifiably without discussion, which resulted in undesirable effect on the current procedures and conduct followed by those using the ISO 15016. This will not allow to apply correction of the effects of the current, while imposing lengthy trial runs that may affect safety of the trials and extend the trial time wastefully long due to avoiding strong current conditions, which is not practical.
- (2) The minimum power requirement that was decided to refer to the Beaufort-8 condition and because of the effect of wave is large, many designs that has proven record of safety on manoeuvrability may not fulfil the requirement particularly so, if the requirement is maintained at the same level for future phases of the EEDI framework.
- (3) These points being unacceptable, SAJ will be working to revise the ISO standards, and to give convincing comments and requirements to ITTC for review, as well as participating in the correspondence group to convey their opinion, and other countries, especially China and Korea to follow suit and cooperate.

Discussion took place and China and Korea already studied the matter to align their position with SAJ, and it was agreed that further coordination will be made between the parties to promote the aim being sought by SAJ.

2. Hydrodynamic Optimization for Energy Efficient Ship Design (by Sung-pyo KIM, DSME)

The presentation covered the development work on the design taking place at DMSE backed by their analysis which led to the motivation of the study, and introducing the cost and effect analysis which designated the areas to focus on, namely the improvement of friction related loss. Study resulted in VLCC case to improve 12%. Methods were also discussed – review of dimensional effect that suggested use of wider beam, review of speed vs. block coefficient was introduced also to seek suitable block coefficient with resistance effect in mind, study of twin propulsion to confirm the effect of twin skeg configuration with longer engine stroke achieving overall higher efficiency gain even with resistance created from increased wetted surface. The presentation further touched upon the energy saving appendages, air lubrication systems, as well as the need for obtaining the feedback from actual operations which was found not easy to obtain. The presentation summarised that the energy efficiency is not any advantage, but a MUST for survival.

3. EEDI Friendly Bulk Carriers 82K R&D (by Lu LI, SDARI)

The presentation covered introduction of the 82K dwt bulk carrier developed from its mother ship with energy efficiency improvements to obtain good fuel rate but with further challenges remaining.

The development was two stage, with the first development made in mid 2010 and the second development made in end 2011.

Fuel rate was greatly improved and the attained EEDI was well superior to the required EEDI, which was the result of various improvements such as hull optimisation, main engine selection, and propeller design, achieving 75% efficiency without appendages and 0.78% with appendages.

As remaining issue, the design needs to be challenged further in respect of exhaust gas temperature being low requiring use of boiler to add fuel consumption, SFC margin of 5% may not be relied upon, depending on the fuel used during trials, which may lead to the level of reduction which may cause concern at phase 3 – measures were briefly discussed, such as LNG fuel, waste heat recovery and low friction paints, or to learn from effects seen on the SEEMP. However, further study is required for those measures to be reliable for actual use.

BWMS

4. Movement of establishing a Guideline for risk assessment of active substances in BWMS on the PSPC coating system(updated information) (by Hideo OBATA, Namura)

The presentation covered the issue with regard to the suitability of the BWMS equipment already approved through the IMO framework, but using chemical substances, and there is a risk that this may not be suitable for the ballast water tank coating applied in accordance with PSPC requirements, pointing out that harmonised revision of the regulation may be too long, and a guideline is required to test the suitability for the shipowner to ensure the target life of 15 years. The latest development is that at MEPC64, the guideline developed by NACE TG-452 was supported and the discussion towards finalisation will be at the BLG17, and based on NACE draft, IPPC and NACE will develop joint proposals to revise GESAMP methodology under the coordination of GESAMP –BWWG chairman, to enable the parties to select a suitable combination of coating and the equipment.

The session noted the need of sharing the information and coordinating in the future to obtain suitable results at the BLG17. The session also noted that since the BWMS equipment is also required to be retrofitted to the existing ships which may be pre-PSPC ships and such combination should also not be forgotten when the discussion takes place at BLG17.

5. Yard Experience of Coping with IMO BWT Convention (by Enguo ZHANG, DSIC)

The presentation covered the convention framework and the effect expected on the newbuilding ships, starting from the background necessitating the convention, the current situation of the ratification of the states, as well as the expected scale of the business involved. The presentation further covered the ratification situation is already covering the number of country requirements and only the gross tonnage fulfilment is not reached but only by less than 7%, indicating that there is a possibility of the effectuation in the mid part of next year. Further the presentation raised concern of the unilateral move of USA presenting their own standard, which in case of State of California, is far more stringent than the current IMO requirements, and also that the USA would require

specifically the approval of the equipment by USCG, which is still an unknown area. Discussion was directed to the effect on ship type where the presenter pointed out that different conditions may apply, due to hazardous analysis, or power requirement. Further, the presenter made a comparative analysis on the recent experience on the Ocean Saver system and the Balcor (Sunrui) system, mostly focusing on the shipyard work and cost. The study revealed the necessity of studying the space elements as early as possible, and the fitting work sequence where pipe and seawater installation may impose negative results of having the filters to be jammed.

Air Pollution

6. Concept Design of LNG Bunkering Ship (by Shohei KOBAYASHI, KHI)

The presentation covered the newly developed concept of the LNG bunkering ship starting from KHI experience on small scale LNG carriers, which supported the development of the LNG bunkering ship, the demand analysis that encouraged KHI to proceed with this study, focusing on the point that in Japan, the use of LNG as fuel is increasingly becoming their interest, with KHI already having developing designs for such LNG fuelled concepts, and that the remaining challenge commercially would be to establish sufficient LNG fuel supply chain to which the bunkering ship would be a viable solution. The presentation covered the technical details of KHI's 6000m³ type bunkering ships highlighting the crucial areas of studies made by KHI, to engage in the design issue on LNG tank, propulsion system and LNG fuel supply system, LNG bunkering interface with LNG receiving ships and special equipment to be fitted on board.

This resulted in KHI adopting IMO Type C cylindrical tanks of aluminium material, and design pressure to 5 barG, DFD mechanical driven propulsion system with BOG compressor and heater/vaporiser as supply system. LNG bunkering interface with LNG receiving ships would need to be decided in conjunction with the receiving ship's specifications. Discussion took place in the case of excessive fuel required for the engine and the countermeasure was understood from the presenter to be a challenge requiring further study.

7. NO_x Reduction Technologies for 2-stroke Diesel Engines to Meet IMO Tier III (by Takahiro FUJIBAYASHI, Hitachi Zosen)

The presentation covered the introduction of the IMO regulation, as to what is required and the available techniques and how from which the EGR(exhaust gas circulation) and SCR(Selective Catalytic Reduction) methods were chosen. EGR was introduced highlighting the simplicity that will allow the system to simple change-over to the two turbo-charger operation, and that the economic analysis was that while the NO_x reduction was secured, there will fuel penalty and that there are already fitted systems showing results. SCR was then introduced showing functions and fittings and then focusing on the nature of the system as after-treatment meaning there will be no fuel penalty, but will be using urea so that the operation cost would be more expensive while the capital cost is less. SCR may need to deal with keeping of the SCR reactor active by increasing the temperature but this will be done through the adjustment of cylinder and SCR by-pass valve. The actual engine fitted with SCR is being tested but the performance was confirmed to be much in line with the results prior to fitting.

The conclusion was that in 2016, the question of which system would be available would be that both EGR and SCR system are available, but there are further questions to be explored as to further tightening of NO_x requirements, or CO₂ requirements, use of LNG gas, etc.

8. Environmentally friendly ship including SCR System (by Seung-un SUNG, Samsung Heavy Industries)

This presentation covered the introduction of the regasification ship which was built to meet the requirements of the US regulations particularly the air emissions (NO_x), sea emission including discharge of cold water, as well as the rain water on deck contaminated by oil, the vessel's noise disturbing the sea mammals. NO_x reduction confirmed by measurement has been reduced to a remarkable 35 tonnes/year passing the USA requirements And the biocide effect of the paints were also considered. The regasification system was finalised as ECO-SRV and avoids discharge of cooling water by use of Glycol. These requirements were needed to be achieved while the regasification capacity was maintained, and the careful approach made by Samsung was introduced, which was all analysed and

then confirmed by testing. Noise reduction was also studied and engineering studies resulted in putting the control system in aft, and achieving the B level required not to disturb the mammals.

Additional points were also studied for the sea chest dimension enlarged to provide less such speed that will not disturb the mammals, and the rainwater contaminated water was collected in the deck collection tank and discharged only after going through the oily water separator system. Another consideration is the non toxic paint, a silicon hull coating which also reduces resistance.