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BWTBOAT AS AN INNOVATIVE SOLUTION TO THE PROBLEM OF BALLAST WATER TREATMENT IN THE LIGHT OF THE BALLAST CONVENTION

The article discusses the concept of using specialist BWTBoat developed by the Indian Register of Shipping (IRClass) as an innovative solution to the problem of ballast water treatment. The article presents a concept of mobile ballast water treatment boats delivering treated ballast water in reference to the requirements of the International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWMC, adopted under the auspices of International Maritime Organisation in London in 2004), which will come into force on 8 Sep 2017. The article presents the possibility to use BWTBoats as other method of ballast water management.

INTRODUCTION

The International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWMC, 2004) will come into force on 8 Sep 2017. The requirements of the Convention impose multiple obligations mainly on shipowners. Some of them pose considerable challenges, both financial and technical. It should be remembered that the shipowner has to incur the costs of purchasing and installing the system and also the costs of staff training, increased energy consumption and additional hours of work. And while installing ballast water treatment system may be technically less problematic in the case of newly built ships, it becomes really complicated with existing ships.

It must be noted that the Marine Environment Protection Committee adopted the amended guidelines for the approval of ballast water treatment systems as late as October 2016, during the 70th session of the Committee (MEPC 70) [1]. This means that the majority of systems currently available on the market are compliant only with the formerly approved guidelines, which does not guarantee their efficacy. At the moment there are no specific figures concerning shipowners' demand to install systems at a specific time. Many shipowners make their decision to install systems conditional on the provisions adopted by MEPC 71 session (3-7 July 2017), which will establish the interpretation of requirements connected with the schedule of entering into force of the provisions concerning the need to install systems. This carries a risk that shipyards will not have enough capacity to install systems.

The abovementioned facts, taken together with the provisions of the ballast convention which allow to discharge ballast water into reception facilities or allow other water management methods, have prompted the maritime industry to search for alternative solutions. One of the concepts, whose approval was solicited for at the MEPC 66 and MEPC 70 by the Indian delegation, is the concept of mobile treated ballast water delivering facilities, so-called BWTBoats, developed by the Indian Register of Shipping (IRClass), a member of the International Association of Classification Societies (IACS).

1. SHIPS' BALLAST WATER TREATMENT

1.1. Requirements for ballast water standards

Standards D-1 and D-2

The requirements for ballast water exchange standards are specified in the provisions of the Convention. The Convention sets two standards, namely standard D-1 (ballast water exchange standard), which should be recognised as temporary, and standard D-2 (ballast water performance standard), which is the target standard. The requirements for both standards are presented in table 1.

Tab. 1. Requirements for ballast water standards.
Source: Authors' own compilation on the basis of [2]

Standard	Requirements	
Standard D-1	Regulation D-1 BWMC Annex	Ships performing ballast water exchange in accordance with this regulation shall do so with an efficiency of at least 95 per cent volumetric exchange of ballast water
		Ships exchanging ballast water by the pumping-through method must pump through three times the volume of each ballast water tank
	<i>Requirements concerning ballast water exchange in order to comply with standard D-1 are set out in Regulation B-4 of the BWMC Annex</i>	
Standard D-2	Regulation D-2 BWMC Annex	Ships shall discharge less than 10 viable organisms per cubic metre greater than or equal to 50 micrometres in minimum dimension and less than 10 viable organisms per millilitre less than 50 micrometres in minimum dimension and greater than or equal to 10 micrometres in minimum dimension
		Discharge of the indicator microbes shall not exceed the specified concentrations described in this regulation
	<i>Compliance with Standard D-2 practically means the necessity to install on board a ballast water treatment system compliant with IMO guidelines.</i>	

Taking into account the above requirements, it should be considered that ships subject to the convention are obliged to manage ballast water by exchanging it or treating it with an approved water treatment system; later the ships will be obligated to manage ballast water by treating it, using an approved water treatment system.

1.2. The possibility to treat ballast water without using BWMS

The interpretation of Regulation B-3 of the BWMC Annex

Regulation B-3 (items 1-5) of the BWMC Annex clarifies the requirements of ballast water management in order to ensure compliance with technical standards set out in Regulation D-1 and Regulation D-2.

This regulation also provides alternative methods of managing ballast water:

- 1) The possibility to discharge ballast water to a reception facility designed taking into account the guidelines developed by IMO for such facilities (Regulation B-3-6).
- 2) Other methods of ballast water management, provided that such methods ensure at least the same level of protection to the environment, human health, property or resources, and are approved in principle by IMO (Regulation B-3-7).

Other methods of ballast water management

At the moment there are two existing options and one new option:

- Shore based Reception Facilities (existing option 1)
- Barge based Reception Facility (existing option 2)
- Treated ballast water delivering facilities e.g. BWTBoat (new option).

Option -1- Shore based Reception Facilities

It is available under regulation B 3.6 and G5 guidelines. Means rather than fitting treatment system onboard, ship can directly discharge untreated ballast to shore based reception facilities. Research reports showed that it is not possible to ensure such facilities at all ports due to inherent problems related to costs required for making big holding tanks, pipe line infrastructure in port etc; so Ship owners gone ahead with onboard fitment of ballast treatment systems.



Fig. 1. Shore based Reception facilities look like land based water treatment plants with holding tanks for treatment of received untreated ballast water from ships. Source [3]

Option -2- Barge based Reception Facility

There is an option with use of a barge located at ballast discharge port fitted with UV treatment system. Such barge will receive

the untreated ballast water from ships and discharge immediately after treatment using UV. In this UV is used in order to avoid large holding tanks shown in fig.1.

This option may be impractical and uneconomical due to issues such as:

- a) Water holding requirement for PSC sampling & testing
- b) Compliance liability will shift from source port, ship owners to discharge port authority which won't be acceptable to them.
- c) Continuous clogging of filter due to high sediments at bottom of ballast tanks resulting in huge filter backwash water slurry which cannot be discharged immediately in water & may need big holding tanks on barge.
- d) IMO don't have procedure to check working of such immediate treatment & discharge system
- e) As there is no guarantee that what kind of water will come from which port, it is too much risky to discharge it immediately with UV treatment without either PSC inspection. That is why holding tanks were shown in option-1 shore reception facility not only for PSC inspection but also resting time to ensure proper water disinfection.
- f) Due to unfiltered water taken at uptake UV will be required to kill species above 50 micron which will not only affect efficacy but also huge power consumption.
- g) UV works better at 5 NTU clear water and so to keep proper UV transmittance in turbid water huge power consumption which is again uncertain due to unknown water quality of incoming ballast water.

2. NEW OPTION: BALLAST WATER TREATMENT BOAT (BWTBOAT) - A TREATED BALLAST WATER DELIVERING FACILITY DEVELOPED BY IRCLASS

2.1. The concept of BWTBoat

Technical description

Since 2012, IRS had been developing an innovative method of ballast water management which can be implemented under regulation B 3.7 of the BWM convention as other method.

IRS reinvented the old port reception facility situated at ballast discharge port (e.g. cargo-loading port) into a treated ballast water delivering facility called BWTBoat i.e. Ballast water treatment boats to be deployed only at ballast uptake ports (e.g. cargo unloading or discharge ports).

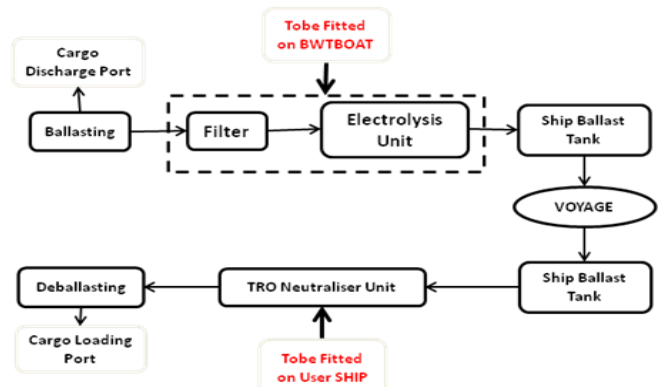


Fig. 2. BWTBoat concept. Source: Authors' own.

BWTBoats basically delivers filtered and chlorinated water to ships to match the IMO D-2 standards at discharge ports. The filters can be chosen wrt water quality at source port of deployment and also redundancy can be ensured, where as chlorine dose can be

adjusted wrt voyage days, species content of uptake water and discharge standards at other port. So there will be hardly any chances of non-compliance at discharge ports during PSC inspection i.e. sampling and testing.

What ship owners need to do is simply retrofit their ships with International Ballast connection and cheap small TRO neutralizer unit. The schematic diagram for visualisation of concept is as follows.

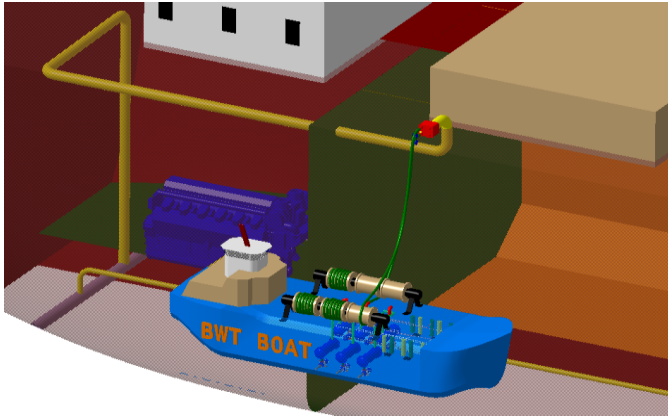


Fig. 3. BWTBoat. Source: Authors' own.

This particular concept had been developed keeping in mind IMO type approved systems and problems with efficacy of treatment systems as well option of port reception facilities.

Advantages of BWTBoat Concept

- 1) Ship Owners will save millions of dollars required for onboard installation of systems.
- 2) Saved money can be diverted for Green technologies to reduce carbon emission as well as fuel consumption.
- 3) Ship owners can receive treated ballast water in return of affordable toll based service fee per ton of ballast (approx. \$0.1 to \$0.25/ton) on as and when required basis.
- 4) BWTBoats is revenue generation opportunity for local community and ports
- 5) Skilled jobs for Seafarers on up and downstream activities
- 6) BWTBoat can be fitted with as many stages of filters to ensure continuous flow and back wash can be easily discharged back to source water.
- 7) Chlorine dose remains as residual disinfectant in the water during the voyage to avoid any regrowth of species

Disadvantages of BWTBoat

Only disadvantage of BWTBoat concept is that availability of such facilities at all the Ballast uptake or cargo discharging ports (not all ports).

Also sufficient number of BWTBoats should be available at a particular port to avoid any delay to ballast operations of Ship.

There is no technical defect as it is using treatment process of IMO type approved system.

Implementation Road Map:

This concept can be well implemented by Industry-flag consortium and special purpose vehicle like Start-up Company, which can ensure availability of BWTBoats with in stipulated time (say 5 yrs relaxation time given by IMO-BWM convention schedule).

As a kick start it can be developed ship type wise e.g. oil tankers, bulk carriers, liner container ships etc and region wise e.g. vessels plying only among Baltic Sea or vessels importing cargo only to Baltic Sea.

In MEPC 66/INF.17 submission, IRCLASS did detailed sea trade analysis for Asia. Around 6300 vessels out of 13000 vessels (dwt>3000ton) ply only among 650 Asian Ports (from Gulf – Oceania-Far East) where as remaining vessels import cargo to Asia from all over the world. So it seems quite easy to provide BWTBoats at 650 ports than retrofitting 6300 vessels.

BWTBOAT as Contingency measure

Some ships will fit treatment system onboard and may face non compliance at discharge ports during PSC inspections due to various reasons such as quality of source port water, inefficacy of onboard treatment system, breakdown of the system in full or part.

In such situation BWTBoat can help to recirculate the ballast water of affected tank after retreatment on boat. High chlorine dose along with proper mixing and filtration will take hardly few hours holding time after which PSC can again sample and test the compliance of water to allow discharge from ship.

IMO-MEPC Acceptance & Recommendation

In 2013, concept of BWTBoats (Ballast water treatment boats) was submitted to IMO-MEPC vide paper 65/2/20. IMO asked for detailed concept and its viability which India submitted later to MEPC 66 though paper nos MEPC 66/2/8 and 66/2/INF.17. IMO-MEPC and international fraternity appreciated the concept during deliberations and sought some queries.

India submitted final revised concept clarifying the queries to MEPC 70 (24-28 October 2016) and received recommendation for its implementation in practice stating that BWTBoats completely falls in the framework of BWM convention (refer Appendix to this article BWRG report MEPC 70/ W.P.10 for details). Group of similar trading ships especially those unloading cargo in dedicated ports can implement this option on shared basis to avoid fitment of ballast water treatment systems onboard.

Extracts from Ballast Water Review Group Report W.P.10 at MEPC 70 about BWTBoats concept - "Other methods of ballast water management"

As instructed by the Committee, the Review Group considered the proposal in document MEPC 70/4/4 (India) on the use of treated water delivering facilities (e.g. BWTBoats), taking into account the comments in document MEPC 70/4/19.

The Review Group considered the BWTBoat and the concept of a treated ballast water delivering facility to be innovative and a useful option for managing ballast water, in particular for ships unloading cargo in dedicated ports. The facility delivers treated ballast water to meet the D-2 standard for the ship involved. It was acknowledged that because the receiving ship would not have a BWMS installed on board, port State control inspections could involve sampling of the ballast water, as necessary.

In its deliberations, the Review Group noted the draft guidance on deploying, using and implementing the treated ballast water delivering facility, set out in annex 2 of document MEPC 70/4/4.

The Review Group noted that where such treated water delivering facilities are used, regional or bilateral agreements may need to be initiated, taking into consideration article 13.3 of the BWM Convention. For instance, the acceptance of the use of the concept as set out on the International Ballast Water Management Certificate could be agreed by the States involved.

The Review Group further agreed that the concept as described is within the regulatory framework of the BWM Convention e.g. BWMS used by BWTBoats comply with Guidelines (G8) and Procedure (G9)) and no approval as an Other Method in accordance with regulation B-3.7 of the BWM Convention is required.

Consequently, the Review Group recommended that the concept of a treated ballast water delivering facility can be implemented in practice.

SUMMARY

To protect ecosystem of one sea from other, International Maritime Organization adopted Ballast Water Management Convention (BWMC) in 2004 to avoid mixing of invasive species through ballast water of Ships. After 12 years of intense international debate, BWMC was ratified. In coming years ship owners would have to retrofit their ships with ballast water treatment systems which may cost from USD 1m to 5m, depending upon size of the vessel.

Looking at slowdown in maritime business and complications with the onboard fitment of systems, IRCLASS has developed an innovative solution in which rather than fitting treatment systems onboard, ship can receive treated ballast water from mobile facilities called Ballast Water Treatment Boats (BWTBoat). The concept got its final acceptance and recommendation from IMO-MEPC70 last year for its implementation in practice.

BWTBoats are required only at ballast uptake or cargo unloading ports. Similar trading vessels based on ship type e.g. oil tankers, containerships or region e.g. Baltic Sea or Ship routes e.g. East America and Europe trade should come together and implement this new option for viable implementation of BWM convention for their fleet.

All over the world there are hardly 2500 ports which deal with international shipping and regional trades by sizable ships e.g. greater than 3000 ton dwt (ballast capacity 500-1000tons). So rather than postponing convention or burdening ship owners with onboard fitment of system which may not work efficiently all the time for all the waters, it is better to adopt port based treated water delivering concept to achieve faster implementation of BWM Convention. BWTBoats can be deployed first at Major ports which contribute to 60% cargo transport of world then to medium and minor one.

BWTBoat is a solution where we are sharing resources in a viable way to achieve sustainable development goal of UN.

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Specjalistyczne barki jako innowacyjne rozwiązanie problemu oczyszczania wód balastowych w świetle wymogów konwencji balastowej

W artykule omówiona została koncepcja wykorzystania specjalistycznych barek (BWTBoat) opracowana przez Indyjskie Towarzystwo Klasyfikacyjne (IRClass) jako innowacyjne rozwiązanie problemu oczyszczania wód balastowych. Artykuł przedstawia koncepcję mobilnych barek w odniesieniu do wymogów Międzynarodowej Konwencji o Kontroli i Postępowaniu ze Statkowymi Wodami Balastowymi i Osadami (BWMC, przyjętej pod auspicjami Międzynarodowej Organizacji Morskiej) w Londynie w 2004r., która wejdzie w życie w dn. 08.09.2017r. Artykuł prezentuje możliwości zastosowania BWTBoats jako innej metody zarządzania wodami balastowymi..

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