

ISSN: 2615-3114

INTERNATIONAL SEMINAR ON MARINE TECHNOLOGY

SENTA 2016



“Marine Technology for Fulfilling Global Maritime Axis”

PROCEEDING

Faculty of Marine Technology
December, 15th-16th 2016
website: senta.its.ac.id



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SPEECH OF RECTOR

Assalamualaikum Wr. Wb.

Ladies and Gentlemen, may I take this opportunity to welcome everyone of you to this conference by praying to the Almighty God for all His blessings, His grace, and His mercies that have made us possible to gather here in excellent condition and good health.

Dear keynote speakers, distinguished guests and participants of the SENTA 2016 with the main topic theme on “Marine Technology for Fulfilling Global Maritime Axis”. It's a pleasant duty for Institut Teknologi Sepuluh Nopember (ITS) to bid you all a genial welcome and host this conference.

Indonesia, where two-thirds of its territory is water, depends heavily on maritime transportation for domestic and international trade. It is necessary to master the maritime technology these days accompanied by other essential knowledges in order to utilize the maritime's natural resources.

Maritime as a part of the vision of ITS has redefined the importance of maritime technology in the four most outstanding research field in this institute. By having this conference and gathering all research institutions, industries and academicians it is expected that new ideas and concepts could be conceived for the future of maritime technology.

The internationalization of SENTA is a response to the need of ITS to be a world – class research university as well as Indonesia as a global maritime axis. Hopefully, we all can significantly give more contributions to the nation advancement in the near future. To all of our distinguished guests and participants, thank you for being here, welcome, and enjoy the conference!

Wassalamualaikum Wr. Wb.

Prof. Ir. Joni Hermana, M.Sc.Es, PhD
Rector of ITS, Surabaya, Indonesia

SPEECH OF DEAN FACULTY OF MARINE TECHNOLOGY

Bismillahirrahmaanirrahiim

Assalamu'alaikum Warahmatullaahi Wabarakaatuh,

I would like to praise God for His blessings and mercies which allow all of us to be part of this international seminar of marine technology, SENTA 2016 that is an annual International Seminar on Marine Technology organized by the Faculty of Marine Technology, Institut Teknologi Sepuluh Nopember (ITS) Surabaya with the theme of Marine Technology for Fulfilling Global Maritime Axis.

On behalf of SENTA 2016, All the academicians of Faculty of Marine Technology Institut Teknologi Sepuluh Nopember and I would like to welcome the honourable keynote speakers, authors, participants. I wish to express our deepest appreciation to all the people who have been kindly encouraged to contribute to this conference through submissions of their research papers. This would be our great pleasure to welcome all of you.

I especially would like to express my gratitude and highest appreciation to the organizing committee on the hard work, perseverance and patience in preparing and organizing this seminar, so it can run well and successfully.

Allow me to wish all of you a meaningful and rewarding seminar for the internationalization of SENTA that is a response to the need of ITS to be an international institute as well as Indonesia as a global maritime axis. Hopefully, we all can significantly give more contributions to the nation advancement in the near future. Thank you and I hope to see you again at the SENTA 2017.

Wassalamualaikum Wr. Wb.

Prof. Ir. Daniel Mohammad Rosyid, Ph.D.
Dean of Faculty of Marine Technology

SPEECH OF CHAIRMAN EVENT

Honourable Rector of Institut Teknologi Sepuluh Nopember (ITS), Prof. Ir. Joni Hermana, MSc.Es, PhD,
Honourable Dean of Faculty of Marine Technology, Prof. Ir. Daniel Mohammad Rosyid, Ph.D.

Assalamualaikum. Wr. Wb.

At this precious moment, let me first express our sincere gratitude to God, who has granted us with blessings and grace that we could gather here today to attend the annual International Seminar on Marine Technology. I'm truly delighted to welcome all keynote speakers and participants to SENTA 2016.

This seminar, organized by Naval Architecture and Shipbuilding Engineering Department of ITS, was initially a national seminar that was held back in 2001, and the internationalization of SENTA is a response to the need of ITS to be an international institute as well as Indonesia as a global maritime axis. SENTA 2016 will be held at Department of Naval Architecture and Shipbuilding Engineering, ITS, Surabaya, on 15-16 December 2016. In accordance to this year's theme, which is **Marine Technology for Fulfilling Global Maritime Axis** SENTA 2016 invites original contributions on the following topics, but not limited to: Ship and Offshore Structure, Marine System, Maritime Manufacturing Industry, Marine System and Maritime Logistic, Maritime Transportation and Logistic, Marine Energy Exploration and Exploitation, Coastal and Natural Resources Management.

Participants in this seminar who originated from graduate students, faculty members, researchers, and academia from various universities and research institutions, and also professional associations and other related organization in infrastructure area have been registered in SENTA 2016.

My deepest thankfulness to all of our speakers, participants and contributors who have given this seminar their generous supports. I would like to express our gratitude and thanks again to all the keynote speakers who have volunteered and spared their busy schedule to contribute to this special event. Many thanks are due to all our Organizing Committee members for their dedication and continuous efforts and hard work in preparing and organizing this seminar. To our lead and supporting sponsors, our most gratitude and thanks for their generous contributions to make this seminar happened. We also owe our success to the full support of the Rector of Institut Teknologi Sepuluh Nopember and the Dean of Faculty of Marine Technology.

Allow me to wish all of you a meaningful and rewarding seminar. Thank you.

Wassalamualaikum Wr. Wb.

Aries Sulisetyono, ST, MAsC, PhD.
Chairman Event

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Design of Sustainable Ship Recycling Yard in Madura, Indonesia

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Keywords: Madura island, layout arrangement, sustainable, ship recycling.

Abstract. Ships older than 25 years are generally unable to be operated any longer due to new more stringent regulations developed by regulators, such as International Maritime Organization (IMO). When ships get older they become less efficient to be used, therefore ship owners choose to decommission them. The most effective and environmentally friendly solution for end-of-life ships is recycling. The ship's recycling process in Indonesia has not met the standard of existing rules and is not environmentally friendly as well as dangerous to the safety of the workers. The objective of this research is on how to design a ship's recycling yard which complies with all regulations and the existing condition in Indonesia. As a case study, the ship recycling yard in Tanjung Jati village, Madura island, in Indonesia is considered. Recycling activities must comply with all regulations and pay attention to the safety of workers as well as ensuring the absence of disadvantages and harmful waste which may pollute soil and the surrounding of seas by providing facilities and proper work procedures. This paper showcases the design of sustainable ship recycling yard with a maximum capacity of 25,000 DWT. All the ship recycling processes are based on the guidelines and the existing conditions. The layout arrangement and technology will prevent, reduce, minimize and pay attention to the safety of workers as well as ensuring proper management and treatment of harmful waste which pollutes soil and the surrounding of seas.

Introduction

The duration of ship operation is approximately 25-30 years. When ships get older not only the operational running costs increase but also they struggle to meet the requirements of new regulations. Recycling old vessels is very important for the renovation of current merchant fleet [1] and for sustainable development of marine industry [2]. In 2002, IMO ventured into new territory by embracing the regulation of ship recycling, bringing new rules for ship owners as well as for ship recycling facilities. One way to make former ship contains economic valuation is through recycling process to put in and reproduce materials from the former ships. Ships are built from a variety of materials and 90% of them are steel. The remaining parts are made from another components composed of hazardous materials to the environment. Nowadays, sustainable ship recycling has been the world's concern. Worldwide within the ship recycling industry, occupational health and safety have been discussed which are controversial topics. In the past, a public image of secrecy, stubbornness and an overwhelming reluctance to change has been felt by the international community from the ship dismantling industry [3]. The poisonous and dangerous cesspit (B3) may be based from various elements of ship's body, among other things, from the used paint, anti-rust materials etc. It may be from the remaining fuel left or shipload as well as from the materials applied in the particular task.

Due to the existing rules, sustainable ship recycling yard is necessary for Indonesia which fulfills the international or national requirements. In Indonesia, there were several ship breaking yards but they did not prioritize the safety of the workers and environment. Therefore, in this paper, a proper layout is designed for development of ship breaking yard into a sustainable ship recycling yard which suits the existing condition in Indonesia.

Sustainable Ship Recycling

According to IMO, ship recycling means the activity of complete or partial dismantling of a ship at a ship recycling facility in order to recover components and materials for reprocessing and reuse, whilst taking care of hazardous and others materials, and includes associated operations such as storage and treatment of components and material on site, but not their further processing or disposal in separate facilities [4]. Meanwhile, the definition of ship recycling yard is a place or facility of ship recycling which granted permit from an authorized party where the shipyard exists [5]. The ship recycling process may be held by beaching or mooring the ships with taking into account the safety and health of persons involved and the impact towards the surrounding environment.

Ships are generally built from a variety of materials and 90% of them is steel. The remaining materials are made from other components in which contains hazardous materials towards the environment. In mitigating hazardous materials requires assessment towards the function of each material. The particular assessment determines the method of continuing management required by the materials. The particular management method consists of:

1. Reuse: Material can be reused by observing the condition and the usage of feasible, simple maintenance may be needed;
2. Recycle: Material can be reused if recycle is being processed in advance;
3. Disposal: Material does not possess economic valuation, thus only disposal process is required.

The Ship Recycling Regulations

1. Basel Convention
United Nations Environmental Programme (UNEP) Convention in Basel, 2003, also developed ship breaking yard model including activities in each zone. The primary function of ship breaking yard model according to the rule of Basel Convention is: limiting hazardous materials, the continuing segregation place from ship components, the temporary shelter of metal materials and hazardous materials, the closest disposal facility.
2. International Maritime Organization (IMO)
The role of IMO in ship recycling pointed out by the existence of “Guidelines of Ship Recycling” whereby managing over the procedure for new ships and old ships in the process of ship recycling (identification procedure of hazardous material, the procedure of the making of sustainable transport); the preparatory procedure prior to recycle process, comprises of evaluation and the selection of ship recycling yard, the arrangement of ship recycling plan, the selection of facility and technology within sustainable recycling yard.
3. United Nation Environmental Programme (UNEP)
UNEP is a primary organization of the United Nations which works in the field of living environment. The role of UNEP in ship recycling is realised in standard rule over the supervision of the movement of second-hand hazardous materials through “The Basel Convention on The Control of Transboundary Movements of Hazardous Wastes and Their Disposal”.

4. International Labor Organization (ILO)

Discuss the regulation over the protection for health and safety of workers who involved in the activity of ship breaking.

The regulation is expected to come into force in coming years and it is a concern for Indonesia because the Indonesian fleet is old, but there are no facilities which comply with the guidelines to recycle them [6].

Discussion

1. General

According to observations and field surveys, Indonesia has 3 ship breaking yards which are located in:

1. Tanjung Jati Village, Kamal District, Bangkalan Regency, Madura;
2. Cilincing, Northern Jakarta;
3. Tanjung Uncang, Batam.

The existence of ship breaking industry in Indonesia is still being categorized as ship breaking yard or place where the demolition and the breaking of ship's parts by using beaching method without taking into account environmental aspect and worker's safety. The existence of a ship breaking industry is not well-known in Indonesia. Henceforth, it causes lack of attention by the government for its development. Nowadays, ship recycling industry in Indonesia is only micro enterprise as a provider of services for ship dismantling. Meanwhile, this industry owns a large potential to be developed into an industry with a national scale. The largest ship breaking location in Indonesia is in Tanjung Jati village, Kamal District, Madura Island.

2. Ship Breaking yard in Kamal, Madura Island

Ship recycling industry as the case study of this research is located in Tanjung Jati Village, Kamal District, Bangkalan Regency, Madura Island. This location is selected due to its reputation as the largest ship breaking industry in Indonesia if observed in terms of the amplitude of territory. The geographical situation of this industry is on the shore of Madura Island situated nearly ± 1 km from Surabaya-Madura harbor, which is Kamal Harbor.

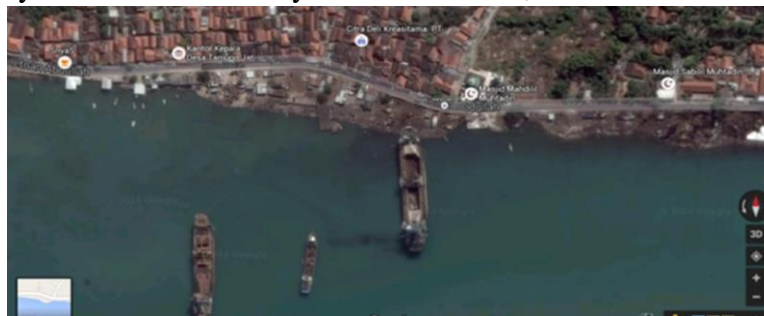


Figure 1. The location of ship breaking yard in Madura.

This location is around 250 meters away from the western side to the eastern side with the length of 25 meters from the beach. There are 3 points of ship breaking locations. The land territory can be functioned as a camp for workers, the place for equipment and materials in production activity, and transportation access. For worker's transportation nor material handling, a part of the particular location is an empty land which is not being utilized.

The docking process is beaching, thus the flux and reflux impact the process to leverage a part of the ships into the land. The breaking process is held when the ship is in the flux and reflux zone. The ship sunk by maximizing the flux and reflux differences of this ship recycling industry is still using traditional equipment and in limited number to run its production activity. This matter is also being affected by the amplitude of land and unmanaged layout, the steel's

ship breaking used the manual cutting machine with oxy-gas acetylene and LPG. There is no storage and containment system to accommodate wastewater during the process of ship dismantling.

3. Layout Arrangement

The ship recycling layout is based on the location model that had been determined as the reference model. The selected layout model is developed based on the United Nations Environmental Programme (UNEP) Convention, Basel, 2003, which enabled material flow as a primary reference in framing this layout.

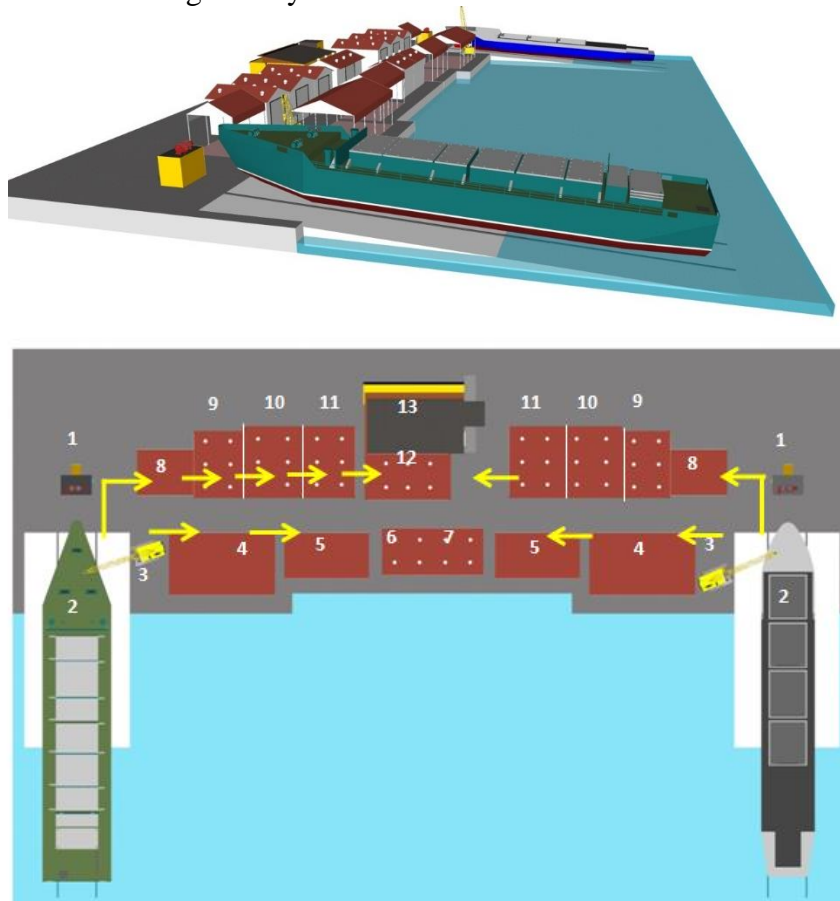


Figure 2. Layout arrangement.

Explanation:

- | | |
|--|--|
| 1. Winch | 7. Scrap storage |
| 2. Slipway | 8. Sorting area |
| 3. Crawler Mobile Crane | 9. Reused storage (Non ferro and ferro) |
| 4. Primary Cutting | 10. Hazmat Storage (Liquid and non-liquid) |
| 5. Secondary Cutting | 11. Waste Storage |
| 6. Coating and decoating tools storage | 12. Finishing Material Storage |
| | 13. Office |

Conclusions

The ship-breaking yard in Madura is a kind of simple business, run by cutting the ship into scrap iron. It can also be seen from the lack of facilities and technologies used during the activities of the cutting process. To develop it into a sustainable ship recycling yard, proper

layout and facilities are required to support the safety of workers and environment. In the present study, the layout is designed based on the flow of material and the geographical conditions with a maximum capacity of 25,000 DWT.

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