Container Design from Fiber Supporting Materials Container Operation Practicum Trainers

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Abstract. Container operation practicum learning is an effort to provide opportunities for cadets to get direct experience in the process of carrying out container loading and unloading activities on board. This research aims to design hatch and container buildings in miniature sizes from fiber materials and then make miniature hatch and container products as learning aids for container operation practicum. The usefulness of this research will answer and overcome shortcomings in learning container operational practices. The miniature container consisting of teaching aids will simulate it with the aim that it can be used as one of the educational media that has a learning-by-doing learning pattern. The implementation of this learning will specifically focus on knowledge about MBPP or SPP into a demonstration simulation with miniature hatches and containers which can be a medium for training and learning about container arrangement problems in ship bays.

Keywords: *Operational, Container, Bay Plan*

1. Introduction

In the development of the transportation system, the presence of containers is a new form of revolution in the marine transportation sector, with the presence of the next container designed and a special ship transporting containers to distribute cargo from the loading port to the unloading port (destination). Sea transport is the backbone of globalization and is located at the heart of the cross-border transport network that supports supply chains and enables international trade. Global seaborne container trade is believed to account for about 60% of all seaborne trade worldwide. This is done to pack cargo safely and move and move faster. For container loading on board, it is necessary to handle arrange, and supervise so that there are no errors or delays during activities at the port, both unloading and loading.

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Along with the rapid demand for sea transportation, sea transportation shipping services must think hard to increase efficiency to increase competitiveness against other transportation services. To achieve this, it is necessary to have knowledge and understanding of the development of related science and technology. Academics can play an active role in contributing in the form of knowledge transfer to sea transportation services. One method of knowledge transfer that can be done is to use practice using teaching aids and work simulations. This miniature container consisting of teaching aids will simulate with the aim that it can be used as one of the educational media that has a learning-by-doing learning pattern.

This study aims to design hatch and container buildings in miniature sizes from fiber materials and then make miniature hatch and container products as learning aids for the container operation practicum. The development of miniature container props will focus on the problem of loading containers in a ship bay. The problem faced in planning to load on ships is commonly called the Master Bay Plan Problem (MBPP) or Stowage Planning Problem (SPP). The complexity of the MBPP problem can be seen from the existing constraints, namely container weight, container destination, container size, container type, and container placement rules. carry. In field practice, the placement of containers on the ship base chooses a ship bay together with the person tasked with loading the container onto the target ship. Guided by the design of the ship bay, the worker can determine the placement of containers according to their various types. This plan aims to educate and stimulate cadets to think about minimizing the occurrence of shifting on containers that are not unloaded at the next port. For the decision to be right, high experience and knowledge are absolute must-haves for stevedoring workers.

The implementation of learning using tools in the practicum session in class can be felt and carried out by both parties both from the user, namely cadets and teaching lecturers. This research will specifically focus on knowledge about MBPP or SPP in a demonstration simulation with miniature hatches and containers that can be a medium for training and learning about container arrangement problems in ship bays.

2. Research Methods

Research on Container Design From Fiber Supporting Materials Container Operation Practicum Props This container carries out the process of making props / miniature containers using fiber materials. Design of miniature containers, hatches, and other complementary props.

Table 1. Container measure

Measure ISO		Scale Miniature 1: 55	
Container 20’	Container 40’	Container 20’	Container 40’
P = 6.058 m	P = 12.192 m	P = 11 cm	P = 22 cm
L = 2.438 m	L = 2.438 m	L = 4,4 cm	L = 4,4 cm

T = 2.591 m	T = 2.591 m	T = 4,7 cm	T = 4,7 cm

The initial stage in designing this miniature design will be made with dimensions or scale 1: 55 which will be made as similar as possible to the shape of the container in real.

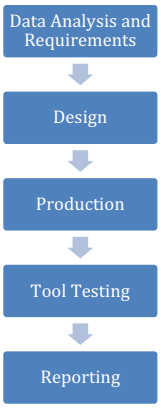


Fig. 1. Flowchart research

Observations were made with the incompleteness of container operational lecture props during lectures, where lecturers and cadets only rely on lecture materials from the material in theory without practice, while for the next semester, cadets are expected to be able to comprehend and understand and be capable of work on container operation activities as provisions later when they practice in the field at the company.

The research consists of five stages starting at stage (1) Data analysis is carried out using observation methods and literature studies. In stage (2) Design, the proposer team will continue the next stage is the design of miniature containers, hatches, and other complementary props (3) Making miniature hatch and container products with fiber-based materials. (4) Conduct testing of props. After the product has been completed, the proposer team conducts testing of the miniature props. and (5) Reporting, the proposing team has carried out monitoring activities and final reports

3. Result and Discussion

Stages of making miniature containers and PVC hatches. Making miniature PVC containers is the initial stage in this study, from the design drawings, miniature containers are made with a reduced size ratio of 55 x from the original size, this miniature PVC container will then be used as a master model which will be the main reference in further printing.

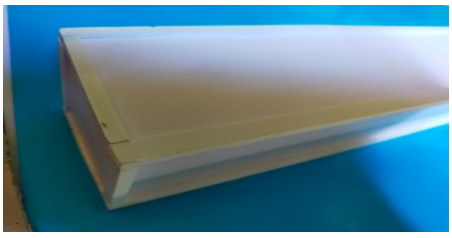


Fig. 2. Miniature PVC

As seen in Figure 2, the PVC part is cut according to the size that has been scaled, namely P x W x H = 110 x 44 x 47 mm. For miniature container sizes of 20 feet and 220 x 44 x 47 for miniature container sizes of 40 feet, the thickness of PVC plates used in making these miniatures is 2 mm, 3 mm, and 5 mm, for walls a thickness of 3 mm is used, a wave plate of 2 mm and a frame structure using plates with a thickness of 5 mm.

Stages of making implicit molds. Plywood mold is used as the outer container of the main mold made from rubber silicon which is used as a permanent mold to print miniature containers made from resin and fiber.

Fig. 3. Miniature in implicit molds

Stages of Making Miniature Container Rubber Silicon Molds. To get a consistent type of object, detailed, has a high temperature, and is not easily sticky, to duplicate this miniature, a permanent mold is used from the basic material of silicon rubber.

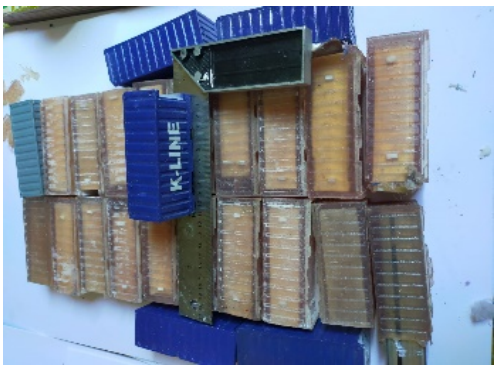
Fig. 4. Miniature in silicon molds

Stages of Printing Miniature Fiberglass Containers. In this miniature fiberglass printing process, carried out by the casting method, all materials and equipment are prepared such as resin, catalyst, tissue fiber, grease, PVC plate, detox glue, and duct tape, with stirring equipment, stirrer, cutter, and elbow ruler. Before entering the printing process, an inner barrier mold is prepared which is made using a PVC plate that serves to hold some of the resin from filling the rubber silicon mold, so that with this barrier, the inside of the miniature container has a space that forms the thickness of the miniature wall, for the thickness of the miniature wall is made thicker than the actual scale.

Fig. 5. Miniature Fiberglass Container

Finishing Stages. The finishing process is carried out after all the miniature containers are printed, each miniature is checked for the construction surface, the excess on the miniature body is cleaned using grinders and misers, and the parts that lack printing results are caulked for further sanding and painting. After the production process is carried out, the results of miniature containers for sizes 20 feet and 40 feet are visible.

(a)



(b)

Fig. 6 a and b. Miniature Product

4. Conclusion

In the implementation of this research, it can be concluded that the design process and production process require a long time and require very detailed and neat measurement accuracy. Many stages must be done and each stage requires its own time so that the production process is carried out as designed at the beginning. Miniatures with a scale of 1:55 can be run and used for learning container operation practicum well.

In making this prop, case studies, and the rules of the game in the development of this miniature are adapted to the theoretical context and also the actual circumstances that exist in the arrangement of containers in the ship bay. The design of these hatches and containers can make a learning tool that uses a simulation platform relating to the design of the container bay ships. The method in this research was carried out starting from designing props and producing products in the form of miniature hatches and containers. In carrying out the miniature demonstration, the container arrangement design given by the lecturer will be evaluated continuously.

The demonstration will provide information on the status of containers that have been laid out in the ship bay. The evaluation carried out is the time needed to solve the problem, whether or not the arrangement is correct, and the amount of unnecessary shifting that occurs. This learning evaluation will also provide feedback to cadets so that the learning process in the classroom as a whole can understand the mistakes made so that they can correct mistakes in finding solutions to master bay plan problem activities.

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