

Quality Assurance and Control of Indonesian Wooden Ship

Zulkairnain Ucok,^a and Abd Khair Junaidi,^{a,*}

^{a)} *Ocean and Aerospace Engineering Research Institute, Indonesia*

*Corresponding author: junaidiperu@yahoo.com

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ABSTRACT

Demand for traditional ship in Indonesia is very high, because the ship is used of fishermen for catching fish as a livelihood. Shipbuilders as manufactures play an important element in building safety and good traditional wooden ships. In the production process, the shipbuilders must be has proper quality control system, in order to match with the owner specification, regulation, and statutory. Therefore, this article discusses about quality control system in traditional ship production process. The research were conducted by direct survey to traditional shipbuilders in Kepulauan Riau-Indonesia by inspect some ships by visual eyes only. From the survey, it was found many discrepancies occur, such as the use of wood has many defects, knur, knot and cracks. In addition, the wood concatenation process is not perfect, which can cause leakage. From the study, the shipbuilders should conduct quality control using other tools instead of visual technique only.

KEY WORDS: *Quality Control System; Shipbuilding; Traditional Ship.*

NOMENCLATURE

<i>QC</i>	Quality Control
<i>NDT</i>	Non-Destructive Test
<i>SDT</i>	Semi-Destructive Test
<i>BKI</i>	Biro Klasifikasi Indonesia

1.0 INTRODUCTION

Indonesia is a maritime country or the world's largest archipelagic state. Indonesia we know it today has a 17.504 big and small islands, about 6.000 of them are uninhabited, which spread around the equator, which gives a tropical weather, and Indonesia's land area is 192.257 million km² and 3.257.483 km² area waters, or equal to 75% of the territory of Indonesia is the sea (Bakorkamla. 2009).

Sea is one source of livelihood for the people of Indonesia. At sea are many benefits to be gained, such as fish. In Indonesia, many people work as fishermen. Fishing vessels used by traditional fishermen in Indonesia are generally made of wood. So that condition of the vessel is needed to be considered.

Good condition of a ship that will provide safety and comfortable for the crews during working in the course of fishing operations. Therefore, in the shipbuilding process, should be very concerned about quality. Quality control (QC) in ship production is necessary to be implemented.

In the ship production process, quality control plays an important role in quality assurance of products which is produced. The application of quality control should meet the owner specification, regulation, and statutory.

This study searches level of quality in traditional ship production process. The study is conducted by directly survey to the traditional shipbuilders in Bintan, Kepulauan Riau-Indonesia. Figure.1 and Figure.2 show location of research area and typical ship which is built in the region, respectively. The purpose of this survey is to know exact quality control system in production process in traditional shipbuilders. Expected from this article is it can be attention to the traditional shipbuilders in order to give attention by applying quality control in production process to meet owner specifications, rules and regulation. In the future, the traditional shipbuilders can improve and be more competitive in the global market.

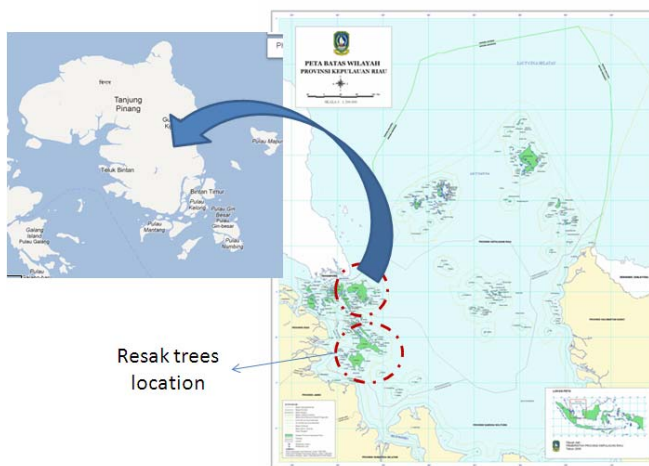


Figure.1: Research location in Kepulauan Riau-Indonesia.



Figure.2: Typical ship built in Kepulauan Riau-Indonesia.

2.0 QUALITY CONTROL IN WOODEN SHIP

Quality Control is a system routine activities are required in the execution of a project, including new ship construction projects or ship repair. In general, the ship can be said to good a level of quality if the vessel can meet all specifications from owner, classification and statutory requirements.

To achieve good quality standards, a shipyard is required to have a good quality management. Application of the quality control system starts from the earliest steps of a process of ship building, i.e. design, where design conformance to specifications, classification & statutory requirements to be a major reference and then compliance is verified or approved by the classification and flag authority.

Quality control implemented for wooden ships in Indonesia is visual inspection. Currently, three ways of the process of

inspection can be done as follow; visual inspection, non-destructive test (NDT) and semi destructive test (SDT).

For inspection wooden ship, visual inspection is most common done by traditional shipbuilders. Visual inspection is simplest method for evaluation of a structure, where major factors such as growth rate, knots, grain angle, moisture content and deterioration govern the strength of the timber. The visual inspections can covers the critical areas and surface deterioration in early stages and appropriate measurements as moisture content can be evaluated as well as the natural defects relative position can be located. For example, the knot ratio's position has great influence and is highly correlated on the strength properties. This is both valid for soft and hardwoods (Ravenshorst et al., 2004).

3.0 WOODEN SHIP'S RULES AND REGULATIONS

Wooden shipbuilding process in Indonesia is governed by BKI (2006) about Rules for Non - Metallic Materials. Within these rules, described on:

- Requirements for Materials, Bonding Methods and Wood Protection.
- Requirements for the Core Materials of Sandwich Laminates.

In the requirement for the material covered about type and classifications of wood and boatbuilding plywood. The bonding methods describes manner of joining wood material in terms of wood protection-issues related to wood protection. While the requirement for the core materials of sandwich laminates explains about cross-cut balsa wood.

Tests of conducted by BKI, include:

- ✓ Raw density (DIN 52182), 3 samples
- ✓ Moisture content (DIN 52183), 3 samples
- ✓ Compressive strength II, (DIN 52185), 6 samples
- ✓ Modulus of elasticity (compression) II, (DIN 52185), 6 samples
- ✓ Shear strength (DIN 53294), 6 samples
- ✓ Shear modulus (DIN 53294), 6 samples

4.0 QUALITY OF TRADITIONAL SHIP IN KEPULAUAN RIAU-INDONESIA

Quality of wooden traditional ships in Indonesia is usually inspected through visual eyes based on master experience. As good material in the market is less and cost constraints, traditional shipbuilders in kepulauan Riau is Indonesia had difficulties for selecting the good materials. Therefore, in fact, a visual inspection, which was conducted by the authors, did not meet the existing standards. There are many discrepancies that occur such as the use of wood that many defects like many knots and cracks. In addition, the wood concatenation process is not perfect, which can cause leakage.

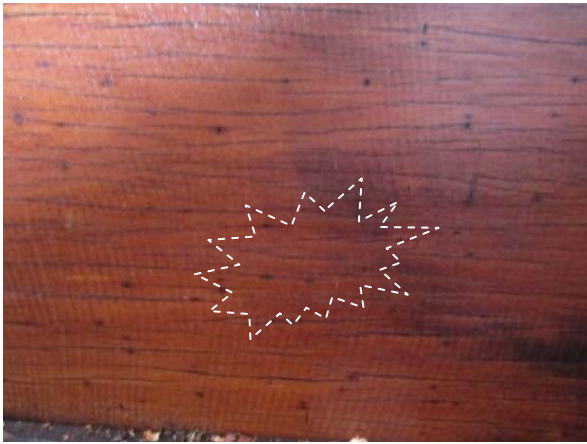


Figure.3: Small knurs and knots distributed on the plank ship.

At the step of material selection, many of which do not meet the standards that have been set. In fact, the vessel material selection is one of the important steps that need to be considered in the construction of the ship because it can determine the technical age of a vessel in carrying out its functions. Material is the basic ingredient that must exist before the ship is build. Therefore, selection of appropriate materials will be able to provide a force structure of the hull, so the operation can be run in accordance with expectations.

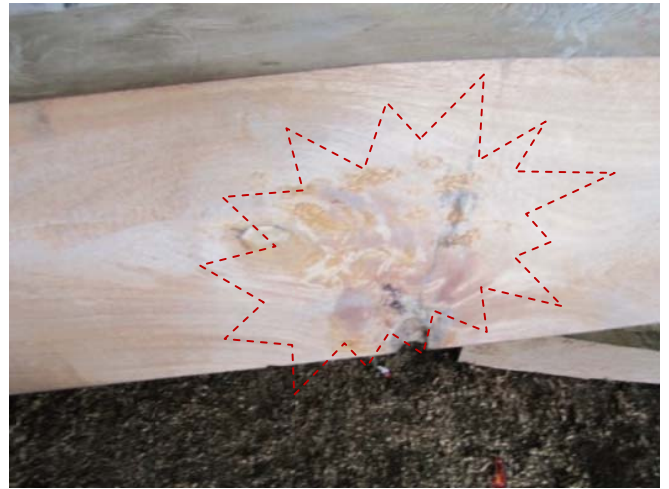


Figure.5: Face knot on the plank ship.



Figure.4: Face knot on the bottom futtock ship.



Figure.6: Face knot and shake on the plank ship.



Figure.7: Connections that do not fit part on the forward, would result in the planned thickness of the boards are insatiabile, so that, can be reducing the strength of the vessel until the weakest point,



Figure.9: This is one of the most important locations for the attention of all fishermen. because it can cause leaks. The leak is the main enemy for the sailors.

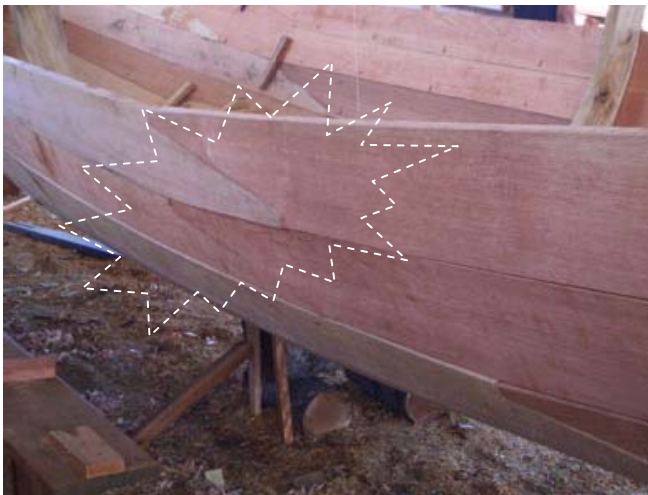


Figure.8: The connection not be able higher than the other to reduce the possibility of concentrated pressure on the high seas and the boat capsized

5.0 CONCLUSION

Traditional wooden shipbuilding in Indonesia should be considered (BKI rules and government), because the traditional wooden shipbuilding plays an important role in the shipbuilding and repair of fishing boats.

The problem is the traditional shipyards perform only one procedure in quality control, i.e. visual inspection and it is done only based on experience, not based on rules and regulation.

Intelligent inspection of wooden shipbuilding process requires knowledge and judgment. Inspection is made to determine that the vessel is safe and seaworthiness. A good basic knowledge about wooden boat is essential.

It is recommended that another quality control system should be applied in the process of inspection.

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