

Compression test of Bamboo Laminated (*Dendrocalamus asper* and *Gigantochloa apus*) in accordance with longitudinal for the best Pliability material at Gligen Section (Part of Anco)

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Abstract—*So far the use of anco often uses materials as a frame. Bamboo is one of the results of non-timber agriculture in the type of grass plants that have basic characteristics not much different from wood. The use of bamboo laminate as an anco / fishing gear has weaknesses in the period of material durability. the use of bamboo as a framework for the period of durability of the material is quite short. The cause of the material is directly used, without any treatment so that the material's durability is less durable. There are factors from nature that reduce bamboo resistance such as examples: Mushrooms, mosses, insects, marine animals. To overcome these weaknesses, it is necessary to conduct a research study on compressive tests on bamboo as well as to lengthen bamboo lamination. After testing with the maximum load testing using software coputional calculation to find out the area in the specimen that has the maximum stress with value 33,26 KN/mm² in node 12 . With maximum deflection 0,14 m in node 54.*

Keywords— *Bamboo Laminated, Anco , Compression Test*

I. INTRODUCTION

Nation Republic of Indonesia is an archipelago which is united by a vast ocean with an area of 5.8 million km² with a coastline of 81,000 km, while the land area is only 1.9 million km². The vast sea waters contain abundant fisheries natural resources. Indonesian people use their water resources by fishing.

Lift net or anco fishing gear is a fishing gear form of nets commonly used in river estuaries. Depending on the season of fish and fish collected in the middle of the net. The definition of this tool is in the form of a net whose hole diameter ranges from 0.5 to 1 centimeter. The net is stretched with a bamboo frame and given a bamboo stalk. The handle of the bamboo stalk serves to reach the middle of the river lifting back without having to go down to the water, see Fig.1



Figure 1 . Lift Net

In its development the use of anco often uses bamboo material as a frame. Bamboo plants are widely distributed in tropical forests in the Asia Pacific and American zones. [1]Bamboo plants are one of the results of non-timber agriculture from grass - grass species that have basic characteristics that are not much different from wood, even in some cases have the advantages and characteristics that are

potential to be developed as substitute raw materials or alternative raw materials in wood-based industry [2].

The use of bamboo as a profile panel for construction purposes, makes bamboo a very popular or competent panel material. The process of making models of laminated bamboo joints is grouped into two characteristics of bamboo which are the basis of consideration, namely : In terms of the characteristics of bamboo related to its ability to be formed by lamination printing techniques and in terms of the ability of bamboo when used as reinforcement structure by utilizing its mechanical properties.[3] The mechanical effects of wet and dry treatments also provide good results from fiberglass in its research on bamboo. Bending Properties evaluation of newly designed reinforced bamboo scrimber composite beams. Engineered Bamboo scrimber : Influence of density on the mechanical and water absorption properties, the size of the cross section of the bamboo affects the mechanical properties of the bamboo laminate [4].

Compressive strength of laminated bamboo needs to be calculated further. This picture see Fig2, describe model of lift net which use bamboo for material. So far coastal communities still use bamboo as the main ingredient in making anco. Because it is considered to have economic value and durable durability. In previous research, bamboo was used as an alternative substitute for making laminates in the construction of civil planning, building planning and furniture equipment.

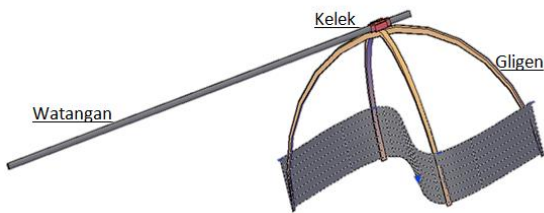


Figure 2 . Model of Lift Net

II. METHOD

2.1 Design of Laminated Beams

The design of this design by using the modeling arrangement of Finite Element Method of laminated bamboo. Bamboo is laminated to 4-5 layers mixing *Dendrocalamus asper* and *Gigantochloa apus*, see Fig 3.

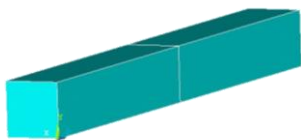


Figure 3 . Model of Specimen

The design of the model uses the MOE value (Modulus of Elasticity of bamboo lamination in accordance is

117110 N / mm² [6] .The design is planned to use 200 number of meshing., see Fig 4. Size of the model specimen is 100 mm x 100 mm x 1000 mm.

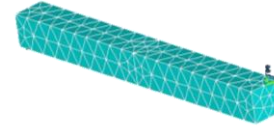


Figure 4 . Meshing

2.2 Force moment

Describing the load received from the specimen, the direction of the force corresponds to the Y axis where the object is carried out by a compressive test simulation. The amount of load received is in accordance with the load received from the voltage calculation. Where to use the following formula:

$$P = \alpha \times A \quad (1)$$

by :

P = Force (KN)

α = Compressive strength (KN/ mm²)

A = Area of Specimen Crossing (mm²)

2.3 Analysis Comparison test

From the analysis process of compressive testing on bamboo lamination using computer software, see fig 5. Described the distribution of deflection occurs towards the Y axis at the top of deflection. At the end of the object it is described that this object experiences resistance from the opposite load (Gligen / part of lift net).



Figure 5 . Compression Test

III. Results and Discussion

In this study we will get the value of the pressure test on bamboo lamisnasi. where the results obtained are in table 1, as seen in table 1.

Table 1. Result Compression Test

Research	Stress (KN/mm ²)
This Paper	33,26
Intang Setyo (2017)	17,65
Yong Zhong (2017)	47,94

For the maximum deflection and deformation testing received by the test specimen, there is a picture in Figure 6.

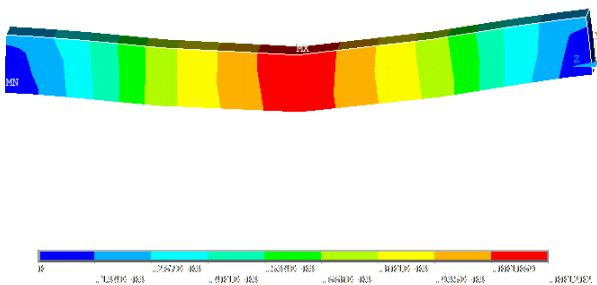


Figure 6 . Result of Deflection

Where is the highest value at 0,14 m at node 54. see fig. 6. As for the maximum received stress at a value of 33,26 KN /mm² at node 12, see fig. 7.

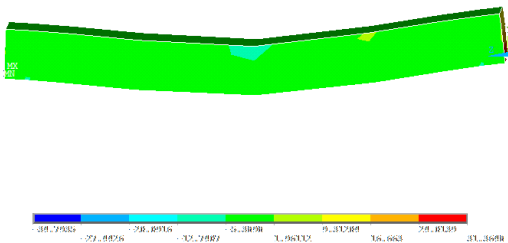


Figure 7 . Result of Stress

IV. CONCLUSION

This bamboo lamination design is very effective and can be applied to the gligen part of the elevator net fishing gear, where the method of formation requires special expertise for the pressing process to get the best bamboo

laminate. The results of the compressive testing of bamboo laminate are still eligible for the bamboo lamination press test where the average taken is 14,82 KN/mm², see table 2.

Table 2. Average Result Compression Test

Result	Value
Stress (KN/mm ²)	14,82
Deflection (m)	0,08

Previous research by Intang 2017, with laminated Dendrocalamus Asper size 50 x 50 x 150 mm have maximum stress 17, 5 Kn/mm² . And research from Yong 2017, with laminated bamboo from compression test with desain silinder dia. 20mm have maximum stress untul 47,94 Kn/mm² . Even when modeled into the form of software computer obtained deflection values that are still in standard of ASTM D143-52 -1997 [5]. So that mechanically it can still be sucked and is useful as an alternative ingredient in the gligen part of the elevator net. Of course in the process of maintenance and use, look again at efforts to make this laminated material more durable.

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