UTILIZATION OF IJUK'S FIBER AS MATERIAL OF PARTICLE'S BOARD

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ABSTRACT
The particle board is an artificial board that uses a mixture of organic adhesives.This board is one of alternative ways because use ijuk's fiber as the material which mixed with plastic waste matrix of glass mineral water. The purpose of this experiment was to compare the particle physics of the particle board, on parameter comparison (Jappanese Standard Associaton (JIS) A 5908-2003 and Indonesian National Standard (SNI) 03-2105-1996.The method used consisted of the process of preparation of tools and materials, weighing matrix and ijuk's fiber, particle printing using hotpress machine, cooling and testing of board characteristics include density, water absorption and thickness development Based on experimental particle board materials obtained density ranges from 0.50 - 0.90 gram / cm3, water absorption 16.38% - 18.63% for 1: 4 and 7.76% - 13.99% for 1: 5 material comparison and thickness development 0.00% - 8.20% for material comparison 1: 4 and 0.56% - 2.60% for 1: 5 material comparison.

Keywords: Particle Board, ijuk's fiber, density, water absorption, thickness

INTRODUCTION
Indonesia is a country with abundant natural resources with very fertile soil conditions to plant all kinds of plants. The agricultural and forestry sectors are the main sectors of this natural resource. As time goes by, the need for natural resources increases as the population growth rate increases as well.

Ijuk's fiber material is a natural fiber material derived from the base of the enau tree (Arengapinnata) that availability in nature. Fiberfibers have the properties of not easily rot, friendly environment and economic value. Traditionally, the utilization of fiberfibers has been used by the community on building construction materials such as roofs and also as a filter layer at the source of absorption (Sarjono and Wahjono, 2008; Anonimous, 2002; Zulfian, 2008).

The formulation of the problem in this research is how the quality of particle board formed from fiberfibers based on their physical properties and how the influence of fibersfiber composition on the quality of particle board.

This study aims to determine the characteristics of particle board formed from fiberfibers based on physical properties and the influence of fibersfibers composition on particle board characteristics.

LITERATURE REVIEW
Ijuk's fibers are fibers derived from enau or palm trees. Enau or aren (Arenga pinnata, Arecaceae tribe) is the most important palma after coconut (coconut) because it is a multipurpose plant. This plant is known by various names such as nau, hanau, peluluk, biluluk, sack, juk or ijuk (various local names in Sumatra and Malaya peninsula); kawung, taren (Sd.); akol, akel, akere, inru, indu (languages in Sulawesi); moka, moke, tuwa, tuwak (in Nusa

Tenggara), and others (Wikipedia. "Enau" November 26, 2017 https://en.wikipedia.org/wiki/Enau)

Yoesoef (1977) and Kollmann et. al, (1975), states that the particle board is a board composed of small pieces of wood (particles) that are close to the original nature of the wood of origin, while Maloney (1976) states particle board is an artificial board made of wood particles or materials other lignosellulose using a mixture of organic or synthetic adhesives and using one or more treatments such as heat, compression, moisture, catalyst and other final treatments.

RESEARCH METHODS

Tools used in this experiment are scissors, for cutting plastic and ijuk's fibers; Press Machine, for printing and heating particle board; Iron frame and print tool (size 30 cm x 30 cm x 0.6 cm), as a tool for printing particle board; Thin plate, as a base on printing and particle boarding; Digital Balance, to weigh the mass of plastic and fiber fibers; Plastic containers, as plastic containers and fiber fibers that have been weighed; Saw, to cut the finished board into a predetermined size. While the material used in this experiment is fiber fibers, as the material of particle board and plastic glass of mineral water, as adhesive matrix.

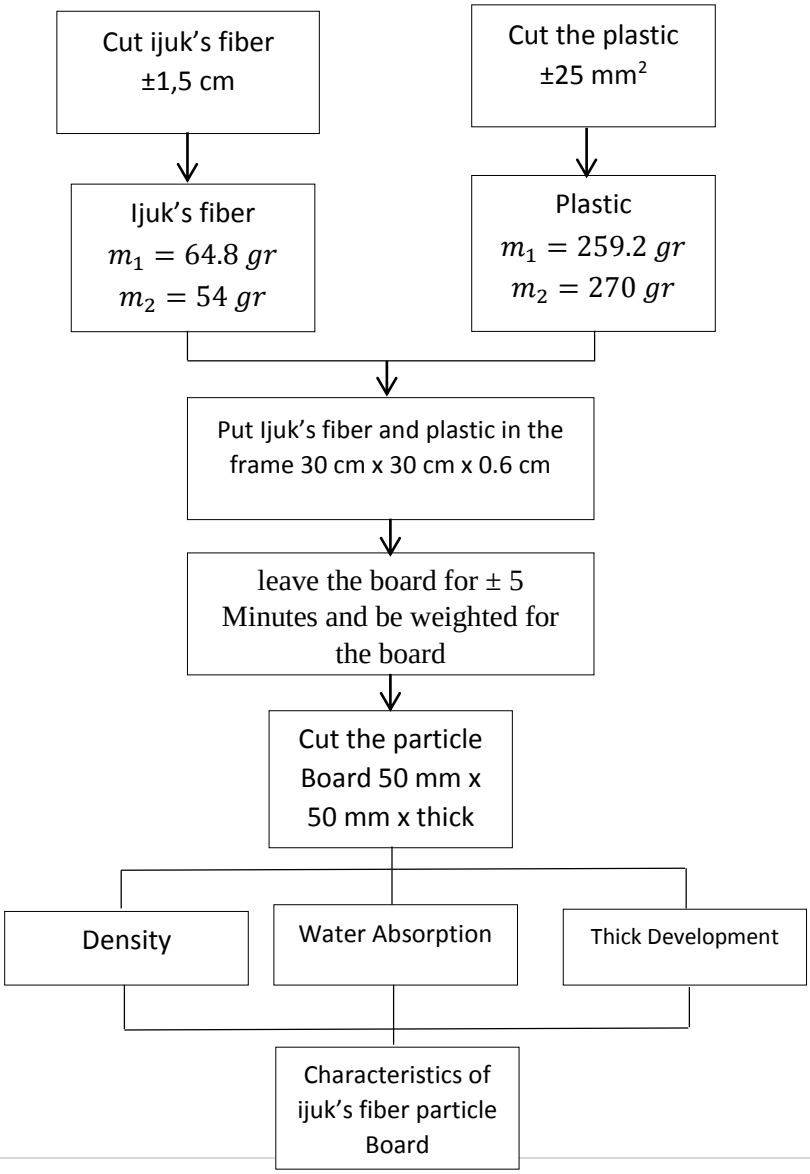

Figure 1. Flow chart of ijuk'sfiber particle board

Preparation Process

Cleaned plastic waste mineral water. Then, dried with a rag or dried. Furthermore, mineralized plastic is chopped using scissors with size ± 25 mm^2. After that, save the mineral water plastic that has been chopped into the container that has been provided.

Clean the fibers that have been taken, separate the portion of the stick (the hard palm fiber) with a soft palm fiber (ijuk'sfiber). After that, cut the ijuk'sfiber using scissors with a size of ± 1.5 cm. Stored fibers ijuk place that has been provided.

Weighing Process

Weighed plastic mass of mineral water and ijuk'sfiber with a ratio of 1: 4 and 1: 5, Then put each material in different containers.

Printing Process

Once weighed, prepared printing equipment in the form of iron plate and iron frame with the size of 30 cm x 30 cm. Then put the mineral water plastic first about 15% of the total mass, then seal the top with ijuk's fibers, then coat back with plastic mineral water and do until the material runs out. While printing Press engine turn on and heat ± 60 minutes, until ± 187^oC temperature with ± 30 Bar pressure. After the heat press machine, place the printed material into the Press machine, heat and wait ± 5 Minutes until the board is formed

Refrigeration Process (Resting)

After the board is formed, leave the board for ± 5 Minutes and be weighted for the board to not expand (This works so no air enters on the hot board). When it is cool, remove the board from the mold and cut the particle board to a predetermined size for the next test.

Testing Process

Plastic board testing is performed to determine whether the resulting product meets the requirements specified for a particular use. Types of tests performed include testing of physical and mechanical properties based on JIS A 5908 (2003) standard. Testing the physical properties of plastic boards include density, moisture content, absorption and thickness development.

Testing of physical properties

1) Density (JIS A 5908, 2003)

The size used for the density test sample is 50 mm x 50 mm x thick. The density of plastic board can be known by using the following formula:

$$Density(gram/cm^3) = \frac{m}{v}$$

Description :

m = mass of test sample (g)

v = sample test volume (cm^3)

2) Thick development (JIS A 5908, 2003)
The sample size of the thickness development test is 50 mm x 50 mm x thick. The test sample was measured in the initial thickness, then the sample test was soaked using cold water for approximately 24 hours. After the immersion, the test sample is removed and preoccupied to remove water on the surface of the test sample and then measured again in thickness to obtain the final thickness. Bold development can be measured by the formula:

$$Thick\ Development\ (\%) = \frac{t_1 - t_0}{t_0} \times 100\%$$

Description :
t_1 = thickness of test sample after soaking (mm)
t_0 = thickness of test sample before soaking (mm)

3) Water absorption (JIS A 5908, 2003)
The sample test size for water absorption is 50 mm x 50 mm x thick. Then weighed the initial mass, then sample test soaked in water for 24 hours. Then after soaking the test sample is lifted and ± 15 minutes to remove water on the board surface. Next is recalculated the final mass. The amount of water absorbed can be calculated using the following formula:

$$Water\ Absorption\ (\%) = \frac{m_1 - m_0}{m_0} \times 100\%$$

Description :
m_1 = mass of test sample after soaking (g)
m_0 = mass of test sample before soaking (g)

FINDINGS AND DISCUSSION

Particle board that has been formed in accordance cut into pieces of predetermined size. In this experiment only tested the physical properties include density boards, water absorption and thickness swelling. The pressure used during the manufacture of these boards about ± 30 Bar. Meanwhile, the temperature used in the printing process ± 187oC, the longer the time spent approximately ± 5 minutes. After that, it takes approximately ± 5 minutes for the cooling process (resting). So the total time used to make a plastic board is ± 10 minutes. During the cooling process, the board must be pressed or crushed using something heavy enough to keep the conditions the board remains in a state of distress.

Density

Based on the density of the experiments have been carried out, the particle board is obtained density ranges in the range of 0.76 0.89 g / cm3 for ratio material 1: 4, and 0.75 to 0.91 g / cm3 for ratio material 1: 5.

Table 1. Particle Board Density of Ijuk's Fiber

The material Ratio	No. Sample	Mass (gram)	Volume (cm3)	Density (gram/cm3)
01.04	1	8.89	10	0.89
	2	9.17	12	0.76
	3	9.23	12	0.77
01.05	7	9.24	12	0.77
	8	8.99	12	0.75
	9	8.21	9	0.91

Water Absorption

Based on the experiment, water absorption was obtained 16.38% - 18.63% for ratio 1: 4 and 7.76% - 13.99% for ratio 1: 5.

Table 2. Water absorption of ijuk's fiber

The material Ratio	No. Sample	The Initial Mass (gram)	The Final Mass (gram)	Water Absorption (%)
01.04	7	9.77	11.58	18.52
	8	9.61	11.4	18.63
	9	9.83	11.44	16.38
01.05	4	10.43	11.3	8.34
	5	10.44	11.9	13.99
	6	12.24	13.19	7.76

Thick Development

Based on experiments that have been done, obtained the results of thick development of 0.00% - 8.20% for the comparison of materials 1: 4 and 0.56% - 2.60% for the material ratio of 1: 5.

Table 3. Development of Thickness of Ijuk's Fiber

The material Ratio	No. Sample	The Initial Thick (mm)	The Final Thick (mm)	Thick Development (%)
01.04	4	6.2	6.2	0
	5	6.1	6.6	8.2
	6	5.8	5.85	0.86
01.05	1	5.8	5.85	0.86
	2	8.9	8.95	0.56
	3	7.7	7.9	2.6

After a series of particle boarding process was done, two particle board measuring 30 cm x 30 cm x 0.6 cm, with a ratio of 1: 4 and 1: 5. The texture of the hard particle board is produced, but only one surface is seamlessly closed plastic while the other surface there are some parts that fiber still visible. This is because at the time of the process of printing using a press machine with high temperature to make plastic is up, so the lower plastic to be a little.

From that data, it can be seen that for the density or density of particle board of ijuk's fiber are eligible from JIS A 5908, 2003 and (SNI) 03-2105-1996 in the range of 0.50 0.91 gram / cm3, 4 and 1: 5. However, when viewed from the shape of the resulting board, the density or density value of the fiberboard fiber is actually close to the plastic density value. The more plastic used then, the value of the board density range will be greater.

As for the absorption of water, the particle board of the fibers of this fibers is relatively large that is about 16.38% - 18.63% for ratio 1: 4 and 7.76% - 13.99% for ratio 1: 5. When viewed from JIS A 5908, 2003 and (SNI) 03-2105-1996. Thus, the particle board does not meet the requirements. This is because, the finished board if cut will be seen the parts of the ijuk's fiber and plastic does not converge, this resulted in the cavities in the board. These cavities are then filled by water, so the fiber water fiber absorption value is high. Yet when viewed from the texture of ijuk's fiber that do not memorize the pore and cell walls, water

absorption should be small. However, when compared to particleboard made of bagasse (Table 4), ijuk'sfiber have a smaller water absorption, so the particle board of the fibers is better than the particle board of bagasse.

Table 4. Physical Properties Parameters, Particles of bagasse

Physical Properties Parameter (Bagasse)	Result
Density	0,79 - 0,89 g/cm^3
Water Absorption (%)	22,47-37,28%
Thick Development	13,5– 21.1 %

For thick development values, the particle board of the fibers of the fibers revolves around the thickness of 0.00% - 8.20% for the 1: 4 and 0.56% - 2.60% for the material ratio of 1: 5. The value fulfills the requirements of JIS A 5908, 2003 and (SNI) 03-2105-1996 which is a maximum of 12%. The presence of air cavities between the fibers of fibers and plastics, making the value of the thick development of large planks. This range of values is biased smaller, if there is no air cavity delivered fiber and plastic fibers. At the time of soaking process for ± 24 Hours, fibers fiber that have been cut to a certain size have separation, although not too significant but causing the value of the development of large thickness. If we compare it with the thick development value of particle board of bagasse, the particle board of the fibers has a smaller value of the guesswork so that the fibers fiber are better used than the particle board of bagasse.

In addition to the value of the test values above, we can also see that the comparison and the fibers that are given also affects the above test values are: the more the number of fibers fiber are given then the range of water absorption test results and the development of thicker the greater. This is because the more fibers are given, the more cavities in the board that resulted in the large amount of water entering and fill the cavities in the board.

In the definition of a particle board, a board is said to be a particle board if between the matrix (adhesive / plastic) and the composite material are fused. But unlike the board made of fiber , which between plastic and fibers do not merge but there are dividing cavities that if seen this board will be shaped like a sandwich. Thus, the board of the fibers of this fiber can't be categorized as particle board.

CONCLUSIONS

Based on experiments that have been done can be concluded that:

The characteristics of particle board of fibers based on their physical properties are: (1) The density ranges from 0.50 to 0.90 gram / cm3, both in the ratio of 1: 4 and 1: 5 materials, in accordance with the provisions of JIS A 5908, 2003 and (SNI) 03- 2105-1996; (2) Water absorption, ranging from 16.38% - 18.63% for 1: 4 and 7.76% - 13.99% material comparison for a material ratio of 1: 5, is not in accordance with the provisions of JIS A 5908, 2003 and (SNI) 03-2105-1996; (3) The development of thicknesses ranges from 0.00% - 8.20% for the 1: 4 and 0.56% - 2.60% material comparison for this 1: 5 material ratio in accordance with the provisions of JIS A 5908, 2003 and (SNI) 03-2105-1996. And the more the number of fibers fiber provided the range of water absorption test results and thicker development is greater.

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