

ANALYSIS OF BEHAVIOR DEFLECTION COMPOSITE PARTICLE BOARD CANE BAGGASE USING ADHESIVES TAPIOCA

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ABSTRACT

Engineering materials such as composites are a blend of a variety of materials that can be made into a product. Particle board as composite an engineering material made from bagasse raw material after the extraction process. Innovation utilization of waste bagasse potentially be used as a composite particle board for furniture interior and furniture . Improved quality internal bonding particleboard made by looking at the effect of the adhesive. Deflection behavior which affects the ability to bending loads owned composite particle board that has broken resistance which can be measured as modulus broken. Ability broken modulus composite particle board as a quality parameter in its application as a furniture material. This method of manufacture of composite particle boards made by the process of emphasis and heated at 120 °C temperature. Models manufactured composite board with a variety of particle volume fraction ratio of bagasse 80%, 70%, and 60%. Binders used are starch adhesive. Bagasse as a filler particle board made of composite granules (mesh) measuring an average of 1.2 mm. Manufacture of composite board made with the same printing pressure that is equal to 100 kgf / cm². The test method modulus of composite particle boards broken according to JIS A 5908 (2003) and SNI03-2015-2006. From these results obtained composite model of particle board on a mixture ratio of 60% : 40% have a fracture modulus (MoR) of 3.67 kg/cm². Whereas another mixture ratio has a value lower than the mixture ratio of 60% : 40%. The use of tapioca starch adhesives can be applied as an adhesive in the manufacture of composite particle board with a range of lower production values. From this condition can be stated that the ability of the composite particle board had a good deflection behavior as parameter endurance and strength. So the quality of the composite particle board bagasse can be applied as a furniture interior.

Index Terms : *particle composite board, bagasse, deflection, furniture*

1. INTRODUCTION

The development of engineered material led to its use is increasing. Engineered materials called composites is the combination of various materials that can be made into a product. Among the types of composite products are composite particle board (particle board) berlignoselulosa of materials derived from plants and gummed then pressed so has the nature of wood (Maloney 1997) . The application of composites technology is widely used as an application in the manufacturing process as new material . According to SNI (2006), the composite particle board is the result of a mixture of hot compression wood particles or other berlignoselulosa material with an organic adhesive and other materials

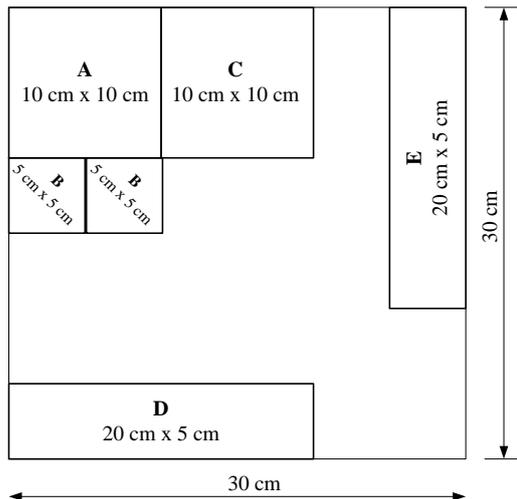
Natural fiber which has the advantage, among others: non-abrasive, low density, cheaper, environmentally friendly and non-toxic, and received widespread attention to continue to be developed. The concept of returning to nature began promulgated to address the environmental damage that is increasingly out of control. One way around that is to use it for something useful. For example, the use of such natural fibers as a reinforcing material composites. Ketermanfaatan bagasse was conducted resulting in the development of process technology diversification agricultural waste into engineering materials composite particle board. Through technological improvements in the manufacturing process of

composite board products using a clamp (compacting), optimization of the composition of the content of the heavy fraction of bagasse chopped into particles is an effort to improve the quality of the resulting repairs. Before the particle-based composite boards waste bagasse produced sustainable Further research is needed to stage a more specific form of the quality characteristics of composite particle boards according to the standard JIS A 5908 (2003) and SNI03-2015-2006 as furniture material development model. One of the quality parameters of composite particle boards produced by the standards of a value of deflection or fracture modulus (MoR). Of course this is related to the use of adhesives in the manufacturing process. Under the conditions of this study will prove the behavior of deflection or fracture modulus (MoR) composite particle board using adhesive tapioca.

2. RESEARCH METHODS

In this research, experimental study on the characteristics of composite boards such as the quality of the resulting composite board quality . Comparison of the volume fraction is used as a variation of the manufacture of composite particle boards wherein bagasse powder ranging from 80 % , 70 % and 60 % . The main ingredient in the form of particle board composite fibers of bagasse first chopped up into granular particles (powder) as required ie mesh size of

1.2 mm. Board composite particles produced according the method of manufacture and optimization of mix variations subsequent test performance. Manufacture of composite particle boards made using pressure (compression) of 100 kgf/cm². It is expected to be produced quality composite board approaches the quality standard JIS A 5908 (2003), about modulus of rupture (MoR). Figure 1 shows the schematic capture and board cutting test material composite particle according to SNI 03-2015-2006



Gambar 1. Skema pemotongan bahan uji

Caption:

- A : Testing of adhesiveness
- B : Internal Testing Bonding
- C : Testing the water absorption after 24 hours immersed
- D : Testing the modulus of elasticity (MoE)
- E : Pengujia fracture modulus (MoR)

The manufacture of composite particle boards using starch as an adhesive variation. Comparison of heavy fractions into determining the needs of raw materials and adhesive powder bagasse tapioca. Particle composite board developed in this study in the production of various types so that in the manufacturing process treated (treatment) by setting the ratio of the main raw material, namely bagasse and tapioca with a strong adhesive printing the same pressure. Manufacture of composite particle boards made with the same printing pressure that is equal to 100 kgf/cm². In this case there are three (3) alternative treatment carried out for the manufacture of composite board based on the composition ratio of bagasse with adhesive powder, the Type IA (80: 20), IIA (70: 30) and Type IIIA (60: 40). Prototype manufacture various types of composite board using bagasse with granules (mesh) of 1.2 mm further treated by heating at a temperature of 120 °C in holding time for 1 hour. Furthermore, the composite particles produced board is dried in the sun ± 7 days, and then the weighing is done in order to obtain the dry mass of the particle composite board. Thus there

will be obtained a composite model of particle board as materials for furniture (furniture) and made possible as a replacement furniture and other wood raw material. Figure 2 shows the type of production of composite particle boards.



Figure 2. The resulting composite board

Testing deflection in getting a fracture modulus (MoR) conducted on the specimen dimensions 20 cm x 5 cm in thickness according thick particle composite is formed. Test specimen glued between two steel beams and the central part loaded to break up . Bending or fracture modulus (MoR) board of composite particles can be calculated by the following formula :

$$MoR = \frac{3 \cdot P \cdot L}{2 \cdot b \cdot h^2}$$

dengan:

- MoR = Modulus of Rupture (kg/cm²)
- P = maximum load (kg)
- L = distance (cm)
- b = width (cm)
- h = thickness (cm)

3. RESULTS AND DISCUSSION

In this study, prepared raw materials as much as possible for the creation and printing of composite particle boards . Raw material requirement calculations performed by predicting the number of variations of the mixture between the adhesive powder bagasse and tapioca . This condition is intended to obtain the optimum variation that is produced as a prototype model that can later be developed as substitutes furniture . From the manufacture and printing of composite particle boards obtained some physical protototype as product development . Results manufacture and treatment of composite particle boards , bending strength or modulus obtained fracture (MoR) as shown in the graph Figure 3.

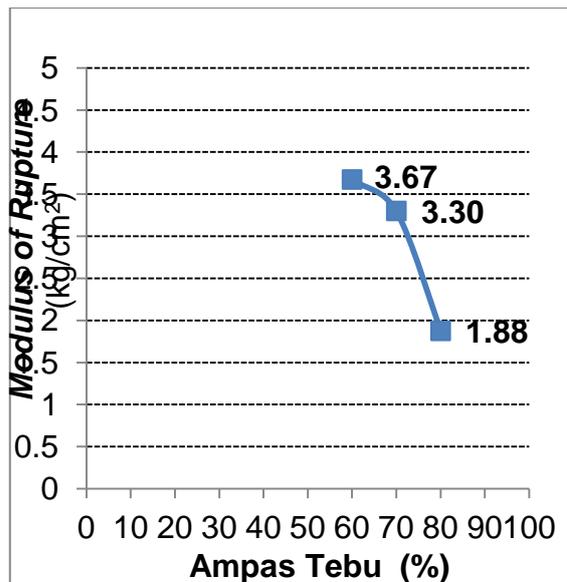


Figure 3. Graph Test Modulus of Rupture of composite particle boards

From the results shown in Figure 3 shows that the prototype board composite particles produced have a characteristic flexural strength or fracture modulus (MoR) high of 3.67 kg / cm² on the composition of 60% bagasse and 40%. This shows that the use of tapioca adhesives can produce a composite board that has the ability to overcome the fracture adhesion. The greater the percentage of adhesive tapioca is used then the ability fracture modulus (MoR) composite particle board would have been better. This shows that the flexural behavior shown by a broken modulus parameter (MoR) The resulting composite particle board can be recommended as an adhesive in the manufacture of composite particle boards. Based on the use of different types of adhesives in the manufacture of composite board adhesive particles included in the category berkerekatan tapioca low (low density particleboard). This condition indicates an influence on the use of composite particle boards is that for the interior alone.

4. CONCLUSION

From this research can be summarized as follows :

- a This study successfully using waste bagasse as raw material for the manufacture of materials that can be developed in the form of composite particle boards . Technical progress and development of this product are varied have discovered a physical prototype board composite particles that can be recommended to users as an alternative material furniture (furniture) interior .
- b Prototype board composite particles produced have deflection behavior with broken modulus parameter (MoR) high of 3.67 kg / cm² on the

composition of 60 : 40 with adhesive tapioca . Manufacture of composite board made with the same printing pressure that is equal to 100 kgf / cm² . From these results it can be stated that the effect of the use of adhesives in the manufacture of composite particle board can affect the quality of board broken modulus composite particles produced . It showed against its use is confined to the interior furniture .

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