

EFFECT OF AGE TO THE FLEXURAL BEHAVIOUS OF LAMINATED BAMBOO BEAM

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ABSTRACT

Bamboo as alternative building material that is environmentally friendly is required today, because disaster due to forest degradation often occur. Using bamboo as building material can reduce use of timber, so forest degradation can be stopped. However, use of bamboo as building material is not maximal due to some obstacles such as opinion that bamboo is building material for low economic people, low resistance against powderpost beetle attack so its usage is short. With good preservation, bamboo usage can be prolonged. In addition, bamboo material is easy to find, and relatively cheap compared other material. Bamboo may be found in field, bought from bamboo trader or bought from bamboo owner. To differentiate young and old bamboo in trading site is difficult because traders have mixed the different-age bamboos. This research was intended to study whether laminated beam of young bamboo can be used or not, because of the mix-age bamboo.

Preliminary test was done to identify physical and chemical property of bamboo using SNI 103-1726-2002. Laminated beam sample was made in three age variations (1-2 years, 2-3 years, and > 3 years) for flexural test. Each variation was made in three repetitions and there were 9 total laminated beam samples. The laminated beam has diameter of 60 mm wide x 80 mm height x 2000 mm length. To stick bamboo laminated, it used Urea Formaldehyde (UA-104) adhesive. Laminated beam pressing was done using cold pressing for about 24 hours.

Result of physical property test indicated density and water content of 1-2 years, 2-3 years, and > 3 years Petung bamboos were 0,59 g/cm³ and 12,50%, 0,77 g/cm³ and 12,46%, and 0,78 g/cm³ and 12,36%, respectively. Result of mechanic property of grain parallel pressure strength, grain perpendicular pressure strength, grain parallel shear strength, grain parallel tensile strength, MOR and MOE, were for 1-2 year bamboo 36,81 MPa, 9,40 MPa, 4,73 MPa, 99,99 MPa, 105,72 MPa and 12443 MPa, respectively; for 2-3 year old bamboo 55,85 MPa, 14,71 MPa, 5,82 MPa, 87,69 MPa, 116, 90 MPa and 16211 MPa, respectively; and for >3 year old bamboo 58,77 MPa, 15,91 MPa, 5,84 MPa, 123,43 MPa, 119,16 MPa and 12443 MPa, respectively. Results of flexural test of laminated beam for their stiffness, flexural strength, shear strength, MOR and MOE for young laminated beam were 239 N/mm, 77,19 MPa, 0,57 MPa, 74,13 MPa and 15029 MPa, respectively; those for moderate laminated beam were 369 N/mm, 113,11 MPa, 0,85 MPa, 114,21 MPa and 20017 MPa, respectively; and those for old laminated beam were 385 N/mm, 129,88 MPa, 0,95 MPa, 131,45 MPa, and 20639 MPa, respectively.

Keywords: bamboo age, failure behavior, laminated bamboo beam

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