ABSTRACT

SULISTYONO. Optimization of Mangium Wood Utilization as Component of the Prefabricated Seismic Resistance House. Under the supervision of SURJONO SURJOKUSUMO, OSLY RACHMAN and NARESWORO NUGROHO.

This research aimed to determine the value of the strength characteristics and strength distribution on ASD/LRFD as well as quality classes of 8 years mangium wood; to examine the characteristics of mangium logs and the processing process, with three most optimal sawing pattern and to find out the reliability and to investigate the behavior of shearwall mangium wood panels on the seismic resistance test.

Materials used were 60 pieces of 8 years mangium logs in 22-42 cm diameter and 210 cm length come from HTI PT Inhutani II, South Kalimantan Province. Samples than tested for the physical and mechanical properties, characteristics of wood and its determination of allowable stress based on format ASTM D 2555-06, ASTM D 2915-03 in ASD/LRFD following the RSNI (2002) and ASTM D 5457-04. Processing of wood involves the log gradings; optimization sawing sawmill with three patterns (conventional, live sawing and live sawing pattern on the MOP program) and the sawing process; drying process with a standard schedule International Finance Corporation (2008) and working processes for the manufacture of wood molding. Shearwalls are tested with racking test (ISO/DIS 22452-2009) using a monotonic lateral load and analysis by SNI 1726-2002. There are four shearwall design patterns size (6.8 x 120 x 240) cm consist of straight sheathing, diagonal sheathing, diagonal windowed sheathing and shearwall with diagonal doored sheathing.

Result showed that physical properties of Mangium wood such as moisture content reach 13.01% and specific gravity is 0.58. Mechanical properties of small clear specimen consist of average MOEs reach 126,960 kg/cm², MOR 1,000 kg/cm². Based on Full Scale-NDT data, MOE value reach 117,298 kg/cm², includes in II-III classes strength based on (NI-5 PKKI; 1961). Allowable stress in the term of Fiber Stress (FS) between FS 7 - FS 22 and the average at FS 12 (SKI C-bo-010:1987). Strength reference between E8 - E17 and the E12 on average (RSNI 2002). Mangium wood is so stiff and strong enough that can be recommended as a structural building materials in structures such as pre-fabricated wooden houses shearwall. Weibull distribution was chosen as the standard distribution for the mangium wood strength.

The characteristics of mangium wood from PT Inhutani II are small diameter, many defects and most of their stem is not round to nearly round, tapered and straight which will affect the quality of the wood. The output result in sawn timber form are 70.9%, 73.5%, and 74.7% respectively; in rough lumber form in follows 44.9%, 42.4%, and 45.5%; in blanking form in follows 37.9%, 35.5%, and 38.2% and in lumber shearing form in follows 27.7%, 26.4%, and 28.3% each for conventional pattern, live sawing pattern and live sawing pattern on the MOP program. The highest output at the live sawing pattern on the MOP program, which is followed by conventional pattern and live sawing pattern. On the mangium wood drying process, a modified conventional method requires 30 days until 11% MC and 33 days until 9% MC. The cost of molding production process of tongue and groove lumber for the prefabricated house include the transportation costs reach Rp 3,845,495/m².

The testing result of shearwall indicated that lumber straight sheathing type is weaker than the diagonal sheathing type, but the process is easier and more flexible. The diagonal sheathing type is stronger and more rigid as it has a triangulation truss. Type A design is appropriate for a small seismic zone (2), type B, D, E1 and E2 are suitable for a medium seismic zone (3, 4) and type C is for a big seismic zone (5).

Keywords: lumber shearing, mangium wood, monotonic load, pre-fabricated house, sawing patterns, shearwall.