ABSTRAK

PROSES PRODUKSI BATA RINGAN *MULTI LAYER LIGHTWEIGHT CONCRETE* BERPENGUAT LIMBAH SERAT TANDAN KOSONG KELAPA SAWIT DAN ASPAL PENETRASI

Oleh:

Reza Ramadhan

Bata ringan *Cellular Lightweight Concrete* (CLC) komersial umumnya berlapis tunggal dan rentan rapuh. Penelitian ini bertujuan memproduksi bata ringan *Multi Layer Lightweight Concrete* (MLLC) dengan inti limbah serat Tandan Kosong Kelapa Sawit (TKKS) dan aspal penetrasi 60/70 , serta menganalisis faktor komposisi terhadap densitas keringnya sesuai SNI 8640:2018. Eksperimen menggunakan metode Taguchi *Orthogonal Array* L9 (3 faktor, 3 level) dengan pengulangan 3 kali. Faktor yang diuji meliputi komposisi inti, rasio semen:pasir lapisan primer, dan rasio adonan : *foam* lapisan selimut. Pengujian densitas kering dan kekuatan lentur (*3-point bending*) dilakukan setelah *curing* 28 hari, lalu dianalisis menggunakan software Minitab melalui nilai SNR dan ANOVA (α = 0,10).

Hasil pengujian menunjukkan seluruh sampel memenuhi standar dengan densitas kering di bawah 1400 kg/m^2. Analisis SNR menunjukkan aspal adalah faktor paling dominan dalam menjaga stabilitas kualitas fisik (Peringkat 1). Sebaliknya, uji ANOVA mengonfirmasi pasir sebagai variabel paling signifikan terhadap rata-rata densitas dengan kontribusi 51,06%, diikuti *foam* (34,94%) dan aspal (9,45%). Meskipun densitas memenuhi standar , kekuatan lentur mayoritas sampel masih di bawah target SNI akibat kurangnya ikatan interfacial antara inti hidrofobik dan selimut hidrofilik. Kombinasi parameter ideal diraih pada aspal level 2 (50:50), pasir level 1 (tanpa pasir), dan *foam* level 1 (1:1).

Kata Kunci: Bata Ringan MLLC, Serat TKKS, Aspal Penetrasi 60/70, Densitas, Taguchi, ANOVA.

ABSTRACT

PROCESS OF CLC LIGHTWEIGHT BRICK PRODUCTION REINFORCED WITH WASTE OIL PALM EMPTY FRUIT BUNCH FIBER AND PENETRATION ASPHALT

By:

Reza Ramadhan

Commercial Cellular Lightweight Concrete (CLC) bricks are generally single-layered and prone to brittleness. This study aims to manufacture Multi-Layer Lightweight Concrete (MLLC) bricks utilizing a composite of waste Oil Palm Empty Fruit Bunch (EFB) fiber and 60/70 penetration asphalt as the core layer , and evaluate the parameters influencing its dry density based on SNI 8640:2018. The experiment was designed using the Taguchi L9 Orthogonal Array method (3 factors, 3 levels) with 3 replications. Tested factors included core composition, cement:sand ratio of the primer, and slurry : foam ratio of the blanket. Dry density and flexural strength (3-point bending) were tested after a 28-day curing period , then analyzed via Minitab software using SNR and ANOVA ($\alpha = 0.10$).

The results revealed that all samples complied with the standard, remaining below 1400 kg/m^2. SNR analysis showed that asphalt was the most dominant factor governing physical stability (Rank 1). Conversely, ANOVA confirmed that sand was the most significant variable affecting the average density with a 51.06% contribution, followed by foam (34.94%) and asphalt (9.45%). Although the density met the criteria , the flexural strength of most samples fell short of the standard due to weak interfacial bonding between the hydrophobic core and the hydrophilic blanket. The recommended optimal parameters consist of asphalt level 2 (50:5
sand level 1 (0 sand), and foam level 1 (1:1 ratio).

Keywords: MLLC Lightweight Brick, EFB Fiber, 60/70 Penetration Asphalt, Density, Taguchi, ANOVA