

# PENGARUH PENAMBAHAN SERAT ALUMINIUM DENGAN KADAR 0,5%, 1,0%, 1,5% PADA BETON MENGGUNAKAN TEKNOLOGI *FOAMING* TERHADAP KUAT TEKAN, KUAT LENTUR DAN MODULUS ELASTISITAS

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## ABSTRAK

Beton ringan merupakan beton yang memiliki berat jenis cenderung lebih ringan dibandingkan dengan beton normal pada umumnya. Beton ringan dengan teknologi foaming diperoleh dengan cara meniadakan agregat kasar dan memasukkan rongga udara (stable foam) didalam beton, pembuatan rongga udara didalam beton menggunakan foam agent. Solusi untuk meningkatkan kuat tekan, kuat lentur dan modulus elastisitas yaitu dengan menambahkan campuran serat aluminium. Presentase penambahan serat ke dalam beton ringan dengan kadar 0,5%, 1,0% dan 1,5%.

Tujuan Penelitian ini untuk mengetahui sejauh mana pengaruh penambahan serat aluminium ke dalam beton ringan terhadap berat jenis, kuat tekan, kuat lentur, modulus elastisitas dan mengetahui kadar optimum dari penambahan serat aluminium. Penelitian dilaksanakan di laboratorium Bahan Struktur Fakultas Teknik STTNAS Yogyakarta dengan mengadakan suatu percobaan langsung yang menghubungkan antara bahan-bahan penyusun yaitu air, pasir, semen, serat aluminium dan cairan busa (foam agent).

Hasil penelitian menunjukkan beton ringan mempunyai berat jenis antara 1568,31 kg/m<sup>3</sup> sampai 1733,75 kg/m<sup>3</sup>. Nilai kuat tekan rata-rata yang dihasilkan dari beton ringan setelah umur 28 hari dengan penambahan kadar serat 0%, 0,5%, 1,0% dan 1,5% sebesar 5,3 MPa; 7,4 MPa; 11,6 MPa dan 9,1 MPa atau mengalami peningkatan 0%, 39,9%, 120,2%, dan 72,0%. Nilai kuat lentur beton ringan serat aluminium kadar 0%, 0,5%, 1,0%, dan 1,5% adalah 1,98 MPa; 2,25 MPa; 3,66 MPa dan 2,89 MPa atau mengalami perubahan kuat lentur dari beton ringan normal sebesar 13,8%, 85,1%, dan 46,2%. Nilai kuat lentur maksimum didapat pada penambahan serat kadar 1% sebesar 3,66 MPa atau mengalami peningkatan 85,1% dari nilai kuat lentur beton ringan tanpa serat. Nilai modulus elastisitas pada beton ringan normal sebesar 4314,28 MPa, sedangkan pada beton ringan yang ditambahkan serat aluminium dengan kadar 0,5%, 1,0%, dan 1,5% mengalami peningkatan nilai modulus elastisitas sebesar 6227,57 MPa, 7165,02 MPa, dan 6851,42 MPa atau mengalami perubahan modulus elastisitas sebesar 44,3%, 66,1%, dan 58,8% dari beton ringan tanpa serat.

**Kata Kunci:** Aluminium, beton, foaming, lentur, modulus, ringan, tekan.

## ABSTRACT

*Lightweight concrete is the concrete that has a density that tends to be lighter than normal concrete in general. The lightweight concrete with foaming technology is obtained by removing the coarse aggregates and inserting the stable foam inside the concrete; the making of the air cavity in the concrete using foam agent. The solution for increasing compressive strength, flexural strength, and modulus of elasticity, is by adding a mixture of aluminum fibers. The*

percentages of the addition of fiber into the lightweight concrete are with the contents of 0.5%, 1.0%, and 1.5%.

The purpose of this research is to determine the extent of the influence of adding aluminum fiber to the lightweight concrete on the density, compressive strength, flexural strength, modulus of elasticity, and knowing the optimum levels of the addition of aluminum fibers. The research is carried out at the laboratory of the Faculty of Structural Materials of STTNAS Yogyakarta, by conducting a direct experiment connecting among the constituent materials which are water, sand, cement, aluminum fiber, and foam agent.

The results showed that lightweight concrete has specific density between 1568.31 kg/m<sup>3</sup> to 1733.75 kg/m<sup>3</sup>. The average compressive strength produced from the lightweight concrete after the age of 28 days with the addition of fiber contents of 0%, 0.5%, 1.0%, and 1.5% of 5.3 MPa; 7.4 MPa; 11.6 MPa; and 9.1 MPa or experiencing an increase of 0%, 39.9%, 120.2%, and 72.0%. The value of the flexural strength of the lightweight aluminum fiber contents of 0%, 0.5%, 1.0%, and 1.5%, are 1.98 MPa; 2.25 MPa; 3.66 MPa; and 2.89 MPa or experiencing changes in the flexural strength of the normal lightweight concrete at 13.8%, 85.1%, and 46.2%. The maximum flexural strength value obtained in the addition of 1% fiber content of 3.66 MPa, or an increase of 85.1% from the flexural strength of the lightweight concrete without fiber. The modulus of elasticity in the normal lightweight concrete is 4314.28 MPa, while in the lightweight concrete with added aluminum fiber with contents of 0.5%, 1.0%, and 1.5%, has increased the modulus of elasticity of 6227.57 MPa, 7165, 02 MPa, and 6851.42 MPa, or experienced a change in the modulus of elasticity of 44.3%, 66.1%, and 58.8%, of the lightweight concrete without fiber.

**Keywords:** Aluminum, concrete, foaming, flexible, modulus, light, press.