PENGARUH PENAMBAHAN LIMBAH SERAT BAJA RINGAN DENGAN PRESENTASE 2% DAN 5% TERHADAP KUAT TEKAN DAN KUAT LENTUR BETON

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ABSTRAK

Semakin banyaknya Industri baja ringan, berakibat banyaknya limbah baja ringan yang dihasilkan. Material baja ringan mempunyai kuat tarik yang lebih tinggi dibandingkan baja siku, sehingga penampangnya bisa lebih kecil daripada penampang baja siku. Kemampuan material baja ringan yang tinggi dalam menahan tarik memungkinkan kuat tarik dapat berpengaruh pada kuat tekan dan lentur beton. Selain itu beton juga digunakan dalam struktur balok bertulang untuk menahan lentur. Meskipun balok sudah diberi tulangan lentur namun ada kalanya balok masih mengalami retak tarik bahkan bisa memicu keggagalan lentur untuk memperkuat lentur balok maka ditambahkan limbah serat baja ringan.

Penelitian ini menggunakan *mix design* berdasarkan ACI 318 *concrete.* Pengujian kuat tekan beton menggunakan benda uji silinder dengan ukuran diameter 15 cm dan tinggi 30 cm sebanyak 9 sampel terdiri dari 3 sampel beton normal, 3 sampel beton dengan presentase 2% dan 3 sampel dengan presentase 5%. Pengujian kuat lentur beton bertulang menggunakan benda uji dengan ukuran 15 cm x 15 cm x 60 cm sebanyak 9 sampel terdiri dari 3 sampel beton normal, 3 sampel beton dengan presentase 2% dan 3 sampel dengan presentase 5%. Proses perawatan benda uji dilakukan dengan perendaman di dalam air selama 28 hari. Pengujian dan analisis kuat tekan berdasarkan SNI 1974:2011 sedangkan kuat lentur menggunakan SNI 4431:2011

Hasil dari penelitian menunjukan bahwa nilai kuat tekan pada presentase 2% mengalami peningkatan sebesar 34,99 MPa dan penurunan pada persentase 5% sebesar 29,25 MPa dibandingkan dengan beton normal sebesar 33,32 MPa. Nilai kuat lentur beton bertulang mengalami peningkatan baik pada presentase 2% sebesar 13,98 MPa maupun pada persentase 5% sebesar 15,03 MPa dibandingkan dengan beton normal sebesar 12,72 MPa. Nilai optimum dari penelitian diperoleh dari kolaborasi dengan variasi presentase 1%, 3%, 4%, dan 6%. Nilai kuat tekan yang optimum yaitu pada presentase 1% dan kuat lentur pada presentase 6%.

Kata kunci: Baja, Beton, Lentur, Serat, Tekan

ABSTRACT

Proliferation of cold-formed steel industries results in abundant cold-formed steel waste. Cold-formed steel's material has greater tensile strength compared to steel elbows, thus its cross-section can be smaller than that of steel elbows. The enormous ability of cold-formed steel's

material in resisting tensile strength allows tensile strength may affect the compressive strength and flexural strength of concrete. In addition, concrete is also used in reinforced beam structures to resist bending. Despite the application of flexible reinforcement, sometimes beams still undergo tensile cracking even it may cause flexural failure and to strengthen beams' flexural strength, cold-formed steel fiber waste is added.

This research employed a mix design based on ACI 318 concrete. Concrete's compressive strength was tested using specimens in the form of cylinders with a diameter of 15 cm and a height of 30 cm as many as 9 samples consisting of 3 samples of normal concrete, 3 samples of concrete at a percentage of 2%, and 3 samples of concrete at a percentage of 5%. Reinforced concrete's flexural strength was tested using specimens with the dimensions of 15 cm x 15 cm x 60 cm, 9 samples in total consisting of 3 samples of normal concrete, 3 samples of concrete at a percentage of 2%, and 3 samples of concrete at a percentage of 5%. Those specimens were maintained by having them immersed in water for 28 days. Compressive strength was tested and analyzed based on the Indonesian national standard SNI 1974: 2011 while for flexural strength, the testing and analysis was based on the Indonesian national standard SNI 4431: 2011.

Findings suggest that compressive strength at a percentage of 2% increased by 34.99 MPa and decreased at a percentage of 5% by 29.25 MPa compared to that of normal concrete, which was 33.32 MPa. The flexural strength of reinforced concrete increased both at percentages of 2% and 5%, which amounted to 13.98 MPa and 15.03 MPa, respectively, compared to that of normal concrete by 12.72 MPa. The optimum value of the research was obtained from collaboration with variations in percentage (i.e. 1%, 3%, 4%, and 6%). The optimum compressive strength was obtained at a percentage of 1% while the optimum flexural strength was generated at a percentage of 6%.

***Keywords**: Steel, Concrete, Flexular, Fiber, Compression*