

PENGARUH PENAMBAHAN LIMBAH SERAT BAJA RINGAN PRESENTASE 3% DAN 6% TERHADAP KUAT TEKAN DAN KUAT LENTUR BETON

Mustafizurrahman, Eka Faisal Nurhidayatullah
Program Studi Teknik Sipil, Fakultas Sains dan Teknologi
Universitas Teknologi Yogyakarta
^[1]rohmanizur48@gmail.com, ^[2]eka.faisal@staff.uty.ac.id

ABSTRAK

Balok beton bertulang merupakan bagian dari struktural sebuah bangunan yang kaku dan dirancang untuk menanggung beban menuju elemen-elemen kolom penopang, tersusun dari beton dan baja tulangan. Balok beton bertulang yang menahan beban semakin lama akan mengalami retak akibat tegangan tarik yang terjadi pada penampangnya. Berbagai penelitian dilakukan untuk mengurangi tegangan tarik yang terjadi, salah satunya yaitu penambahan limbah serat baja ringan kedalam beton konvensional. Baja ringan dikenal sebagai material yang memiliki kuat tarik yang tinggi sehingga diharapkan dapat menambah kuat lentur dengan mengurangi kemungkinan terjadi daya retak tarik pada penampang balok lentur.

Penelitian ini dilakukan untuk mengetahui pengaruh penambahan limbah serat baja ringan presentase 1%-6% terhadap kuat tekan beton dan kuat lentur balok. Pembuatan campuran material untuk benda uji ini berdasarkan *mix design* ACI 318 *concrete*. Proses pencetakan benda uji silinder dan balok dilakukan di Laboratorium Bahan Universitas Teknologi Yogyakarta. Sedangkan pengujian kuat tekan dan kuat lentur balok dilakukan di Laboratorium Bahan Bangunan Universitas Negeri Yogyakarta, pengujian dan analisis sesuai dengan SNI 1974-2011 untuk uji kuat tekan, dan SNI 4431-2011 untuk uji kuat lentur balok. Penelitian ini diharapkan dapat memanfaatkan limbah serat baja ringan yang sudah tidak memiliki nilai ekonomis agar bisa memiliki nilai guna lagi.

Hasil penelitian menunjukkan bahwa Kuat tekan beton pada penambahan limbah serat baja ringan presentase 3% meningkat sebesar 35,36 MPa dan mengalami penurunan pada presentase 6% sebesar 29,99 MPa dibandingkan dengan beton normal sebesar 33,32 MPa. Kuat lentur balok penambahan limbah serat baja ringan presentase 3% dan 6% mengalami peningkatan sebesar 15,24 MPa dan 15,32 MPa dibandingkan dengan beton normal sebesar 12,72 MPa. Diperoleh nilai optimum penambahan limbah serat baja ringan presentase 1% sebesar 36,66 MPa untuk kuat tekan beton, sedangkan presentase 6% sebesar 15,32 MPa untuk kuat lentur.

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

ABSTRACT

Reinforced concrete beams are part of a building structure that are rigid and designed to bear the load towards the elements of supporting columns, composed of reinforcing steel and concrete. Reinforced concrete beams that hold the load will eventually crack due to tensile stress along

their cross section. Numerous researches have been conducted to reduce the resulting tensile stress, one of which was adding cold-formed steel fiber waste to conventional concrete. Cold-formed steel is well-known as a material with great tensile strength and thus it is expected that it can increase flexural strength by minimizing the possibility of cracks due to tensile strength along the flexural beam cross-section.

This research aimed to determine the effect of the addition of cold-formed steel fiber waste at percentages of 1%-6% on concrete's compressive strength and beams' flexural strength. The mixture of materials for research specimens was prepared based on the mix design ACI 318 concrete. The specimens, i.e. the cylinders and beams, were casted at Yogyakarta Technology University Materials Laboratory while the beams' compressive strength and flexural strength were tested at Yogyakarta State University Building Materials Laboratory. Testing and analysis were performed based on the Indonesian national standards SNI 1974-2011 for the compressive strength test, and SNI 4431-2011 for the flexural strength test on beams. It is expected that this research will pave the way for utilization of cold-formed steel fiber waste which no longer has an economic value in order to be useful.

Findings show that concrete's compressive strength in the addition of cold-formed steel fiber waste at a percentage of 3% percentage increased by 35.36 MPa and decreased at the addition percentage of 6% by 29.99 MPa compared to normal concrete, which was 33.32 MPa. The beam flexural strength in the addition of cold-formed steel fiber waste at percentages of 3% and 6% increased by 15.24 MPa and 15.32 MPa, respectively, compared to that of normal concrete, which was 12.72 MPa. The optimum value for the addition of cold-formed steel fiber waste at a percentage of 1% was 36.66 MPa for concrete's compressive strength, while at a percentage of 6% was 15.32 MPa for flexural strength.

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