PENGARUH PEMANFAATAN *PRE-TREATMENT SPENT BLEACHING EARTH* (SBE) DENGAN *FLY ASH* SEBAGAI SUBTITUSI PARSIAL SEMEN TERHADAP KUAT TEKAN BETON

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ABSTRAK

Penelitian ini bertujuan untuk menganalisis pengaruh pemanfaatan *pre-treatment Spent Bleaching Earth* (SBE) yang dikombinasikan dengan *fly ash* sebagai substitusi parsial semen terhadap kuat tekan dan penyusutan (*shrinkage*) beton mutu rencana *f'c* 20 MPa, serta memodelkan prediksinya menggunakan algoritma *Decision Tree Regression* pada *software* RapidMiner Studio. Penelitian eksperimental laboratorium ini menggunakan benda uji silinder berukuran 150 mm x 300 mm. Variasi campuran yang diuji meliputi: 5% SBE + 25% *fly ash*, 10% SBE + 20% *fly ash*, 15% SBE + 10% *fly ash*, dan 20% SBE + 10% *fly ash* dari total bahan pengikat. Pengujian kuat tekan dilakukan pada umur 7 dan 28 hari, sedangkan pengujian *shrinkage* diamati hingga 72 jam. Hasil pengujian menunjukkan bahwa kombinasi SBE dan *fly ash* memengaruhi sifat fisik dan mekanis beton. Variasi campuran 20% SBE + 10% *fly ash* + 70% semen memberikan performa terbaik dengan kuat tekan tertinggi sebesar 19,20 MPa pada umur 7 hari dan 20,23 MPa pada umur 28 hari, sehingga berhasil mencapai mutu rencana *f'c* 20 MPa. Nilai penyusutan terendah diperoleh pada variasi 10% SBE + 20% *fly ash* dan 15% SBE + 10% *fly ash* sebesar 0,65%. Integrasi data eksperimen dengan pemodelan komputasional RapidMiner menghasilkan prediksi nilai kuat tekan yang presisi. Dengan demikian, pemanfaatan *pre-treatment* SBE dan *fly ash* berpotensi sebagai material alternatif ramah lingkungan (*green concrete*).

Kata kunci: *Spent Bleaching Earth* (SBE), *fly ash*, kuat tekan beton, *shrinkage*, RapidMiner

THE EFFECT OF UTILIZING PRE – TREATED SPENT BLEACHING EART (SBE) WITH FLY ASH AS A PARTIAL CEMENT REPLACEMENT ON THE COMPRESSIVE STRENGTH OF CONCRETE

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ABSTRACT

This study aims to analyze the effect of utilizing pre-treated Spent Bleaching Earth (SBE) combined with fly ash as a partial cement replacement on the compressive strength and shrinkage of concrete with a target strength of f'c 20 MPa, as well as modeling its prediction using the Decision Tree Regression algorithm in RapidMiner Studio. This laboratory experimental study utilized cylindrical specimens measuring 150 mm x 300 mm. The tested mixture variations included: 5% SBE + 25% fly ash, 10% SBE + 20% fly ash, 15% SBE + 10% fly ash, and 20% SBE + 10% fly ash of the total binder weight. Compressive strength tests were conducted at 7 and 28 days, while shrinkage was observed up to 72 hours. The results indicated that the combination of SBE and fly ash significantly affected the physical and mechanical properties of the concrete. The 20% SBE + 10% fly ash + 70% cement mixture exhibited the optimum performance, achieving the highest compressive strength of 19.20 MPa at 7 days and 20.23 MPa at 28 days, thereby meeting the target strength of f'c 20 MPa. The lowest shrinkage value of 0.65% was obtained from the 10% SBE + 20% fly ash and 15% SBE + 10% fly ash variations. Integrating experimental data with RapidMiner computational modeling yielded high precision in predicting compressive strength. Thus, the utilization of pre-treated SBE and fly ash shows great potential as an eco-friendly alternative concrete material (green concrete).

***Keywords**: Spent Bleaching Earth (SBE), fly ash, compressive strength, shrinkage, RapidMiner.*