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# Mechanical Activation of a Waste Material Used as Cement Replacement in Soft Soil Stabilisation

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**Abstract :** Waste materials or sometimes called by-product materials have been increasingly used as construction material to reduce the usage of cement in different construction projects. In the field of soil stabilisation, waste materials such as pulverised fuel ash (PFA), biomass fly ash (BFA), sewage sludge ash (SSA), etc., have been used since 1960s in last century. In this study, a particular type of a waste material (WM) was used in soft soil stabilisation as a cement replacement, as well as, the effect of mechanical activation, using grinding, on the performance of this WM was also investigated. The WM used in this study is a by-product resulted from the incineration processes between 1000 and 1200oc in domestic power generation plant using a fluidized bed combustion system. The stabilised soil in this study was an intermediate plasticity silty clayey soil with medium organic matter content. The experimental works were conducted first to find the optimum content of WM by carrying out Atterberg limits and unconfined compressive strength (UCS) tests on soil samples contained (0, 3, 6, 9, 12, and 15%) of WM by the dry weight of soil. The UCS test was carried out on specimens provided to different curing periods (zero, 7, 14, and 28 days). Moreover, the optimum percentage of the WM was subject to different periods of grinding (10, 20, 30, 40mins) using mortar and pestle grinder to find the effect of grinding and its optimum time by conducting UCS test. The results indicated that the WM used in this study improved the physical properties of the soft soil where the index of plasticity (IP) was decreased significantly from 21 to 13.10 with 15% of WM. Meanwhile, the results of UCS test indicated that 12% of WM was the optimum and this percentage developed the UCS value from 202kPa to 700kPa for 28 days cured samples. Along with the time of grinding, the results revealed that 10 minutes of grinding was the best for mechanical activation for the WM used in this study.

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