**Editorial**
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# Editorial on Cement with High Content Limestone Calcined Clay

**Vemula Reddy R***

*Department of Civil and Materials Engineering, University of Illinois at Chicago, Chicago, USA*

## Editorial

Three mix designs with varied VMA dosages were presented to evaluate the impact of Viscosity-Modifying Additive (VMA) on the extrudability of limestone and calcined clay-based cementitious materials. The ram extrusion was used as an extrusion model in order to investigate the new properties of printed materials. Based on the ram extruder configuration, two methods were used:

(a) Extruding materials at the same extrusion speed at different rest times to evaluate how the pressure changes over time;

(b) Extruding materials at varying extrusion speeds at the same rest time to examine material flow parameters.

The study's key conclusions can be stated as follows: the extrusion pressure of all mix designs increased over time. The extrusion pressure was increased under 0.25 mm/s piston speed and the shape retention of the extruded filaments was improved by increasing the dosage of VMA at the same tested age; the correlation between the experimental results and the Basterfield model was excellent; the correlation between the experimental results and the Basterfield model was excellent; (R-squared value: 0.99).

Elongational yield stress, flow consistency, and shear yield stress were all higher in the mixture with more VMA. Calcined clays are the only possible materials available in substantial quantities to meet the needs of eco-friendly cement-based materials by lowering the clinker content in blended cements or lowering the cement content in concrete. Calcined clay has emerged as the most promising supplemental cementitious ingredient for reducing clinker/cement.

The mechanical strengths and sulphate resistance of blended cements containing a high percentage of calcined clay as a pozzolanic addition were evaluated in this study to show that these cements could be designed as CEM (cement) type IV/A-SR and IV/B-SR cements according to the current European standard UNE-EN. Two Portland cements (P1 and PY6) with differing mineralogical compositions and calcined clay were used to make the blended cements. By weight, the degree of replacement was greater than 40%.

The results show that when the two Portland cements are replaced with calcined clay at a degree of replacement more than 40%, their mechanical strengths decline and their sulphate resistance increases. These findings are the result of the calcined clay's pozzolanic activity having a chemical effect. As a result, there is a significant reduction in portlandite levels in the paste liquid phase, resulting in an increase in sulphate resistance and a fall in mechanical strengths. More than 200 recent research publications on the topic of substituting substantial amounts of calcined clay for Portland cement are presented and analysed in depth.

The basic knowledge regarding the characteristics and structure of clay minerals is first described. The activation and hydration of clays, as well as pozzolanic activity measurement methodologies, are next discussed. Various testing procedures for clays from various worldwide deposits are also discussed. After that, the use of calcined clay in cement and concrete technology is discussed. Lime calcined clay cement is given its own chapter. The impact of calcined clay on concrete durability is then summarised. At the end, conclusions are drawn.

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***Address for Correspondence:** Vemula Reddy R, Department of Civil and Materials Engineering, University of Illinois at Chicago, Chicago, USA, E-mail: Rvreddy@sen.edu*



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