Efficiency of high energy over conventional milling of granulated blast furnace slag powder to improve mechanical performance of slag cement paste

Ahmed Bouaziz, Rabah Hamzaoui, Sofiane Guessasma, Ridha Lakhal, Djamel Achoura, Nordine Leklou

PII: S0032-5910(16)30882-8
DOI: doi: 10.1016/j.powtec.2016.12.014
Reference: PTEC 12162

To appear in: *Powder Technology*

Received date: 4 October 2016
Revised date: 28 November 2016
Accepted date: 3 December 2016

Please cite this article as: Ahmed Bouaziz, Rabah Hamzaoui, Sofiane Guessasma, Ridha Lakhal, Djamel Achoura, Nordine Leklou, Efficiency of high energy over conventional milling of granulated blast furnace slag powder to improve mechanical performance of slag cement paste, *Powder Technology* (2016), doi: 10.1016/j.powtec.2016.12.014

Efficiency of high energy over conventional milling of granulated blast furnace slag powder to improve mechanical performance of slag cement paste

Ahmed Bouaziz[1], Rabah Hamzaoui[2] , Sofiane Guessasma[3*], Ridha Lakhal[4], Djamel Achoura[4], Nordine Leklou[5]

[1] Civil engineering research laboratory, University of Biskra, Biskra, Algeria
ad.bouaziz@gmail.com

[2] Université Paris-Est, Institut de Recherche en Constructibilité, ESTP, 28 avenue du Président Wilson, 94234 Cachan, France
rhamzaoui@estp-paris.eu

[3] INRA, Research Unit BIA UR1268, Rue Geraudiere, F-44316 Nantes, France
sofiane.guessasma@inra.fr

[4]Materials and Environment laboratory, University of Annaba, Algeria
ridhalakhal@yahoo.fr, achoudj@yahoo.fr

[5]LUNAM, Université de Nantes – IUT Saint-Nazaire, GeM, CNRS UMR 6183, Research, Institute in Civil Engineering and Mechanics, France
nordine.leklou@univ-nantes.fr

Corresponding authors: sofiane.guessasma@inra.fr

Abstract

This work aims at bridging the efficiency of ball milling of granulated blast furnace slag (GBFS) to the structural and mechanical properties of slag cement pastes. Both conventional and high energy milling of GBFS are considered with a milling duration varied between 1 and 10 hours. X-ray diffraction, infra-red spectroscopy, granulometry analysis and scanning electron microscopy are used to draw the main lines of structural and morphological changes occurring during milling. Cement pastes formulated using 45% of GBFS in substitution are characterised. Workability, X-ray diffraction analysis, differential scanning calorimetry and compressive testing are performed to analyse main structural changes and reactions driven by the presence of milled GBFS as well as its direct consequence on the mechanical strength of slag cement pastes. Slag milling indicates the superior efficiency of high-energy milling,