# USE OF ULTRA-FINE SUGAR CANE BAGASSE ASH AS CEMENT REPLACEMENT

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Brazil is the greatest producer of sugar cane of the world. Two types of ethanol fuel are produced: hydrated, which is used as straight fuel to power alcohol vehicles, and anhydrous which is blended to gasoline as octane enhancer.
The major sugar-alcohol industry by-products are bagasse, cane-washing water, leaves and ends, filter tart, yeast and vinhoto. The bagasse is used in the energy production (steam/electricity), fuel, hydrolysis, paper pulp, cellulose and wood veneer.
Considering that the Brazilian sugar cane producing in 2004 was 410 millions tones, approximately 120 millions tonnes of the bagasse was generated. In Brazil, the bagasse is usually burned (95%) to produce steam, which can be used either as mechanical power for the mill drivers, or to energy cogeneration. For 2010, it is expected that 1,500 MW of electrical power will be generated by bagasse burning. In this process, a new by-product is generated: residual sugar cane bagasse ash (SCBA).
The SCBA is composed mainly of silica ($SiO_2$). This characteristic indicates its potential as mineral Portland cement admixture; nevertheless there are few studies about its application. This paper presents the results of an experimental program developed in order to produce an ultra-fine SCBA and to value its performance as mineral admixture in conventional and high-performance concretes. The ultra-fine SCBA was produced through optimization of the mechanical grinding, where granulometry, specific surface and pozzolanic activity of SCBA were assessed. The conventional and high-performance concretes were made with 0%, 10%, 15% and 20% of ultra-fine SCBA as cement replacement (in mass). The fresh, mechanical and durability properties of the concretes were performed and the results indicated that the ultra-fine SCBA has a high potentiality to be used as cement admixture. Its availability in Brazil indicates that it can be used, in this country, in large quantities in the closest future, and the evolution of petroleum market shows that ultra-fine SCBA has potential to partially replace cement in other parts of the world.

Keywords: Sugar cane bagasse ash; Mineral admixture; cement replacement