

EFFECT OF KILN SPEED ON SIZE RELATIONSHIPS OF THE SILICATE CRYSTALS IN TYPE I PORTLAND CEMENT CLINKER AT ASH GROVE CEMENT'S DURKEE, OREGON PLANT

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ABSTRACT

The time that a clinker nodule spends in the burning zone of the kiln, also known as the residence time, can have quite an effect on the microstructure of the resulting clinker. The kiln speed, expressed in rpm, or revolutions per minute, controls the residence time. This means that the faster the kiln speed, the lower the residence time will be. Reflected light microscopy can be used to track resulting changes in the clinker microstructure as the kiln speed is increased, and estimates can be made as to the possible effects these changes may have on the performance of the cement made from that clinker. Crystal size, reactivity, and structure, as well as porosity of the nodule itself, can all be improved with an increase in kiln speed, and some detrimental conditions can also be at least partly remedied. Overburning can, for example, be at least partly counteracted by increasing the kiln speed and decreasing the residence time. However, there appears to be a point of diminishing returns which is eventually reached, after which no apparent structural changes will be observed if kiln speed is increased further. A marked change in crystal size relationships was observed in the clinker from Ash Grove Cement's Durkee, Oregon plant in the latter part of 1999 and the early part of 2000, and the above mentioned "point of diminishing returns" seemingly reached.