



Effect of Low Mixing Speed on the Properties of Prolonged Mixed Concrete

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Abstract

The mixing process of concrete consists of dispersing the constituent ingredients (i.e. cement, admixtures, sand, and gravel) in water to homogeneous and solid product. The properties of the final product depend on mixing parameters such as mixing time and mixing speed. Ready Mixed Concrete (RMC) should be mixed for a long time with limited speed until delivered to the working site. This long time depends on long transport distances and traffic conditions. The present study investigated the effects of long mixing time on the properties of concrete without any change in its proportions during the mixing process and the effects of using the chemical admixtures: super plasticizers and retarders on its effectiveness, using a drum batch mixer. It has two directions of rotation: one for mixing concrete and the other for discharging it. This research identified concrete mixtures with local available materials i.e. cement, sand as fine aggregates, dolomite as coarse aggregates, water and chemical admixtures. Mixtures were prepared with the same cement and water content with constant sand to dolomite ratio with different dosages of chemical admixtures. Chemical admixtures were used to keep concrete flow during mixing. Mixtures were prepared with low mixing speed 1rpm for identified long mixing times more than 90 minutes from adding water to other components Slump and compressive tests were used as measurement tools of fresh and hardened concrete Retempering with extra water or chemical admixtures was prevented through mixing, so mixtures were extracted without target slump value. Findings showed that low mixing speeds made mixtures more effective for long times, the exceeding mixing time led to minimize water to cement ratio due to reduction of water content, and there was an inverse relationship between slump flow and compressive strength in case of no re-tempering. Therefore, slump flow of mixtures decreased by time, but on the other hand, compressive strength enhanced i.e. stiffening took place. The present study proved that the properties of the final product depends on mixing parameters such as mixing time and mixing speed, and that Ready Mixed Concrete (RMC) would be more effective if mixed for a long time with limited speed until transported to the work site. In addition, chemical admixtures with prolonged mixed concrete should be used to improve workability rather than compressive strength.

Keywords: Mixing Time; Mixing Speed; Superplasticizers; Retarder.

1. Introduction

Concrete is one of the most construction material widely used all over the world. The final form of concrete depends on the properties of the selected raw materials and the mixing process conditions. Selections and proportions of raw materials are based on the required characteristics of concrete, and the mixing process disperses the constituent ingredients i.e. cement, sand and gravel in water to get homogeneous and solid components. This complex process depends on the mixing method, the mixing time and the mixing speed. Ready Mixed Concrete (RMC) is used all over

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