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COMPARATIVE STUDY ON DIFFERENT RATIOS OF FOUNDRY AND WASTE FOUNDRY SAND IN CONCRETE

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Abstract

In this study, the fresh and hardened properties of concrete made with foundry sand (FS) and waste foundry sand (WFS) were investigated. Sand was replaced with 10, 20 and 30 percent of FS and WFS in order to study the effect of heat and subsequent process reactions on concrete properties. Slump, compressive strength, indirect tensile strength, flexural strength, ultrasonic pulse velocity (UPV), modulus of elasticity and durability parameters such as water absorption & permeability, chloride penetration and alkali silica reaction (ASR) were conducted in different substituting of FS and WFS. The results showed that the use of FS increases the compressive, flexural and tensile strength, UPV and modulus of elasticity of concrete. In contrast, WFS increases water absorption & permeability, chlorine penetration and tensile strength. According to the results, the replacement of 10% WFS has the lowest reduction compared to the control mixture. In the indirect tensile strength test, replacement of both types of foundry sands was faced with increasing resistance. In all of the mix designs, the concrete workability compared to the control mixture was reduced. The SEM results of mixtures with 30% FS replacement reveal better compaction and no porous in transition zone (TZ).

Keywords: reuse, solid waste management, sustainable development, waste foundry sand

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