

Granulated Blast Furnace Slag and its Effects on Concrete

Methodology:

Experimental Research

Data Collection:

All Data is collected from experiment by breaking cylinders

This research explores what place slag, or granulated blast furnace slag has in our changing environment and evaluates how it compares to Portland cement. The purpose of this research is to discern how slag will be applicable in the future of construction and find what place it will have in concrete mixes. Slag is a Supplementary Cementitious Material (SCM) that is being utilized in more and more concrete applications due to its desirable properties and low environmental impact. Slag also reduces the amount of CO2 released that is produced in manufacturing and placing concrete. In this research, compressive strength of slag replacement mixes are evaluated against the strength of standard Portland cement concrete through compression testing of cylindrical specimens. Mixes in the amount of 10%, 25%, and 50% slag replacement by weight for cement are tested. This research finds that there are many different aspects to slag as a construction material, and most importantly slag takes longer to develop its compressive strength than does cement. Additionally, it is weaker over a standard 28-day testing schedule. This was found to be due to a few factors, mainly the speed of hydration due to the lack of calcium hydroxide.

CONTROL MIXES				
FINE		COARSE	CEMENT	WATER
Material Quantities (LBS)				
A	70	90	40	18.2
B	69.6	88.8	39.8	18
C	68.8	91.4	38.8	16.4
D	68.8	91.2	40	16

SLAG MIXES					
FINE		COARSE	SLAG	CEMENT	WATER
MATERIAL QUANTITIES (LBS)					
10%	70	90	4	36	18.2
25%*	70.4	93.6	11.2	30.4	19.8
25%	70.8	90	10	30	19
50%	69.6	89.8	20.2	21	21.2

Control Mix Slump (IN.)	
A	1.125
B	0.625
C	0
D	0

Slag Mix Slump (IN.)	
10%	2.6
25%*	3.1
25%	1.75
50%	2.5

Key Wrds: Slag, CO2, Feasibility, Compressive Strength

