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STUDY ON THE PROPERTIES OF HIGH STRENGTH CONCRETE USING GLASS POWDER AND LATHE SCRAP

T.Sezhiyan[1], R.Rajkumar[2]

[1]PG scholar, Department of Civil Engineering, Kongu Engineering College, Perundurai,

[2]Assistant Professor, Department of Civil Engineering, Kongu engineering College, Perundurai.

ABSTRACT- Glass is used in many forms in day-to-day life. It has limited life span and after use it is either stock piled or sent to landfills. Since glass is non-biodegradable, landfills do not provide an environment friendly solution. Hence, there is strong need to utilize waste glasses. Many efforts have been made to use waste glass in concrete industry as a replacement of coarse aggregate, fine aggregate and cement. Its performance as a coarse aggregate replacement has been found to be non-satisfactory because of strength regression and expansion due to alkali-silica reaction. The research shows that there is strength loss due to fine aggregate substitution also.

The aim of the present work was to use glass powder as a replacement of cement to assess the pozzolanic activity of fine glass powder in concrete and Study the Properties of concrete. The present study shows that waste glass, if ground finer than 100µm shows a pozzolanic behavior. It reacts with lime at early stage of hydration forming extra CSH gel thereby forming denser cement matrix. The early consumption of alkalis by glass particles mitigate alkali-silica reaction hence increase durability of concrete.

Lathe scarps are the waste materials which are collected from workshops and other steel industries at very minimum cost. They are similar to the steel fiber but they don't have any regular shape and size. The dimension varies with nature of source that is depends upon the type of industries. Scraps considered in this work are 0.5mm thickness.

KEYWORDS: Glass powder, lathe scrap.

1. INTRODUCTION

Concrete is a compound material made from sand, gravel and cement and is used in building construction. The cement is a mixture of various minerals which when mixed with water, hydrate and rapidly become hard binding the sand and gravel into a solid mass. The other major part of concrete besides the cement is the aggregate. Aggregates include sand, crushed stone, gravel, slag, ashes, burned shale, and burned clay. Fine aggregate (fine refers to the size of aggregate) is used in making concrete slabs and smooth surfaces. Coarse aggregate is used for massive structures or sections of cement the oldest known surviving concrete is to be found in the former Yugoslavia and was thought

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TIME PERIOD	CONVENTIONAL (N/mm^2)	10%	20%	30%	40%
7 days	26.12	27.15	28.95	29.58	29.65
14 days	34.65	35.50	35.85	36.25	35.65
21 days	40.85	41.05	42.15	43.50	42.88
28 days	48.25	48.85	49.05	51.90	48.90

to have been laid in 5,600 BC using red lime as the cement. The first major concrete users were the Egyptians in around 2,500 BC and the Romans from 300 BC The Romans found that by mixing a pink sand-like material whichthey obtained from Pozzuoli with their normal lime-based concretes they obtained a far stronger material. The pink sand turned out to be fine volcanic ash and they had inadvertently produced the first 'pozzolanic' cement. Pozzolana is any siliceous or siliceous and aluminous material which possesses little or no cementations value in itself but will, if finely divided and mixed with water, chemically react with calcium hydroxide to form compounds with cementations properties.

The Romans made many developments in concrete technology including the use of lightweight aggregates as in the roof of the Pantheon, and embedded reinforcement in the form of bronze bars, although the difference in thermal expansion between the two materials produced problems of spalling. It is from the Roman words 'caementum' meaning a rough stone or chipping and 'concretus' meaning grown together or compounded, that we have obtained the names for these two now common materials.

2. MIX PROPORTION

Cement = 400 kg

Water = 160 kg
Fine aggregate = 660 kg
Coarse aggregate 20 mm = 701 kg
Coarse aggregate 10 mm = 467 kg
Water: cement: F.A.: C.A. = 0.4: 1: 1.65: 2.92

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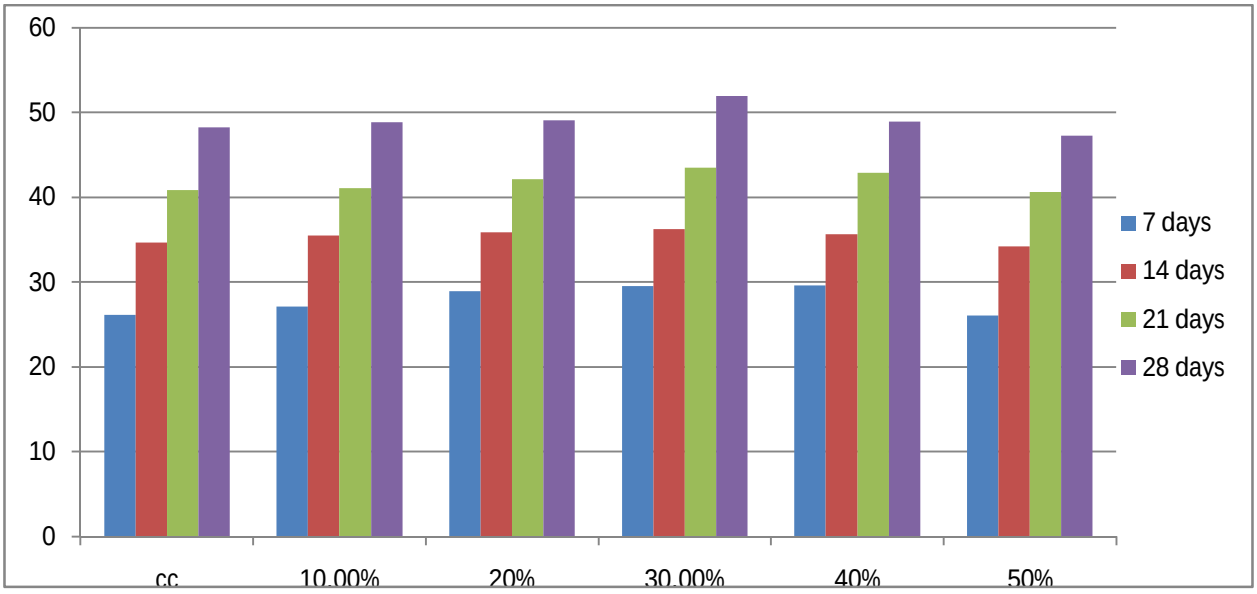
3. COMPRESSIVE STRENGTH



4. SPLIT TENSILE STRENGTH

TIME PERIOD	CONVENTIONAL	10%	20%	30%	40%	50%
7 days	1.65	2.58	2.66	2.85	1.95	1.85
14 days	2.05	2.98	3.1	2.98	2.88	2.12
21 days	2.95	3.24	3.38	3.35	3.34	2.45
28 days	3.1	3.6	3.84	3.68	3.8	2.98

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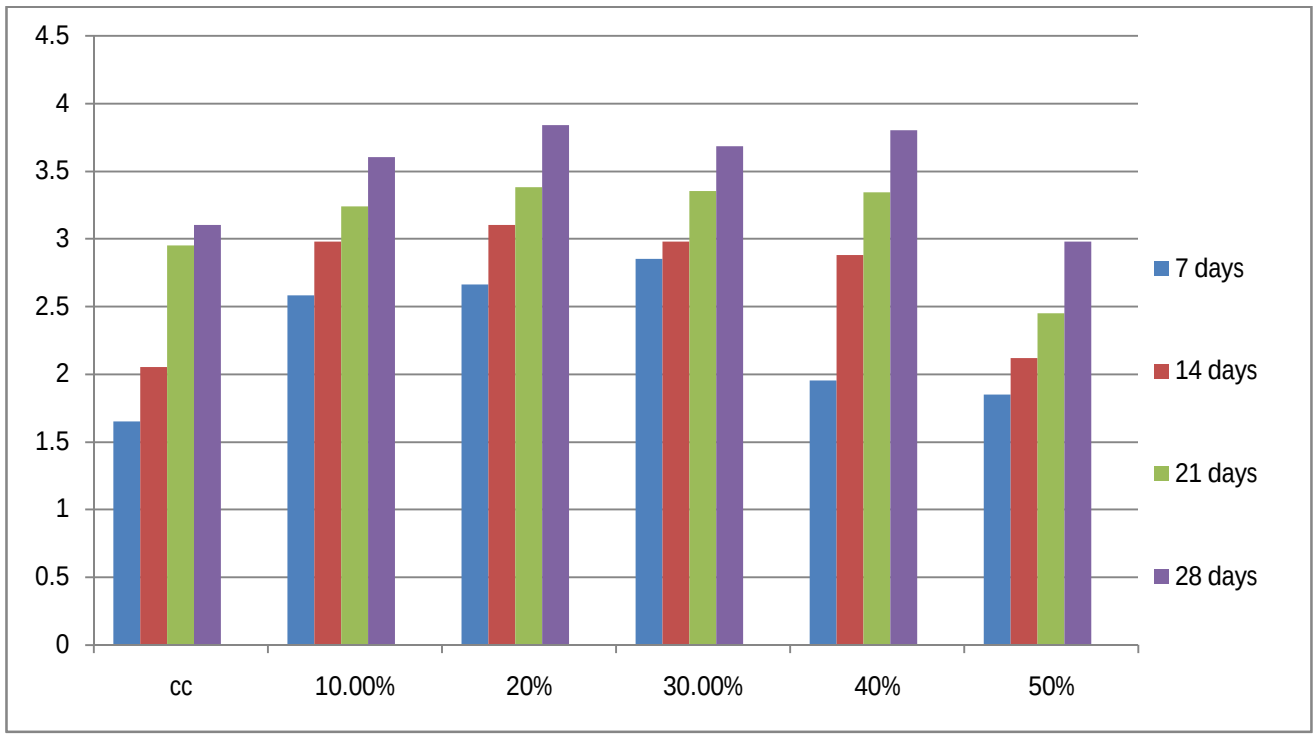

5. FLEXURAL STRENGTH

TIME PERIOD	CONVENTIONAL	10%	20%	30%	40%	50%
7 days	2.58	2.65	2.89	3.15	3.25	3
14 days	3.45	4.58	4.05	4.18	3.4	3.38
21 days	5.06	6.48	6.85	7.05	6.45	5.05
28 days	7.47	8.85	8.98	9.1	8.15	7.4

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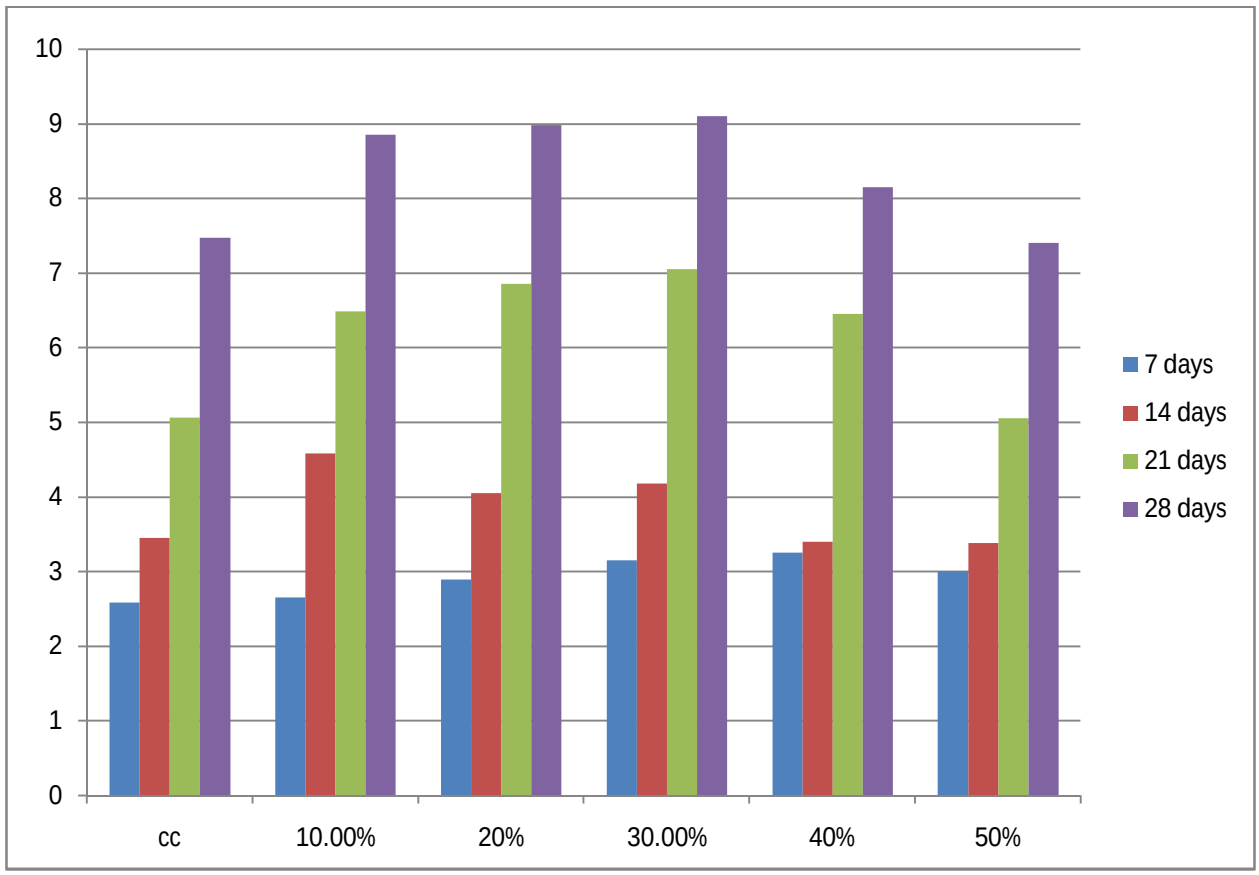

6. CONCULSION

Compressive strength of 30% glass powder replacement concrete has found to be 10% increase in strength, when compared to that of Conventional concrete. Split tensile strength of 20% glass powder replacement concrete has found to be 10% increase in strength, when compared to that of Conventional concrete. Flexural strength of 30% glass powder replacement concrete has found to be 10% increase in strength, when compared to that of Conventional concrete. Hence 30% concentration of glass powder replacement in concrete is found to be the optimum dosage for his project work.

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