

Experimental investigation of concrete with use of Waste glass powder and Brick dust : A Research

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ABSTRACT

In structural building concrete is the most broadly utilized development material as a result of its high basic quality and security. Brick dust and waste glass powder, the waste material which is gotten from assembling of brick kiln and glass industrial facility. The substitution of sand by brick dust and substitution of concrete by squander glass powder. The present research work was done to think about the strength and workability of cement containing brick dust and waste glass powder as fractional substitution of sand and concrete at different rates. In this examination the test examination completed in two stage M25 review of cement is utilized with block tidy in extents of 5%,10%,15% and 20%. In second stage Waste glass powder in different extents of 5%, 10%, 15% and 20% were tried. From this examination the quality of 10% substitution of Brick dust gives more quality when contrasted with ostensible blend and also found that 20% replacement of waste glass powder gives more workability but gives less strength.

Keywords: Concrete, Brick dust, Waste glass powder, Workability, Compressive strength.

I. INTRODUCTION

Concrete is a composite material made out of fine and coarse total fortified together with a liquid bond that solidifies after some time. Most cements made with other pressure driven bonds, for example, calcium aluminates concretes. Concrete has generally high compressive quality, however much lower rigidity. Hence it is typically fortified with materials that are solid in pressure. The versatility of cement is generally consistent at low feelings of anxiety however a star diminishing at higher feelings of anxiety as network splitting creates. Concrete has a low coefficient of warm development and therapists as it develops. Every single solid structure split to some degree, because of shrinkage and pressure. Solid that is subjected to long length powers is inclined to crawl. At the point when total is combined with dry Portland

bond and water, the blend frames a liquid slurry that is effortlessly emptied and formed into shape. The concrete responds synthetically with the water and different fixings to frame a hard network that ties the materials together into a sturdy stone like material that has numerous employments.

Bond is a fine dark powder, it is blended with water and materials, for example, sand, rock, and smashed stone to make concrete. The bond and water frame a glue that ties alternate materials together as the solid solidifies. The common bond contains two essential fixings to be specific argillaceous and calcareous. In argillaceous materials dirt Predominates and in calcareous materials calcium carbonate prevails.

Coarse Aggregate—Generally coarse total comprises of pounded stones. They ought to be all around reviewed, spotless and hard. They offer mass to the

solid and anticipate shrinkage of bond. Normal adjusted totals may likewise be utilized as coarse total. Because of smooth surface they give great workability with similarly lesser amount of water.

Fine Aggregate—Generally fine aggregate consist of waterway sand. It anticipates shrinkage of bond. At the point when encompassed by concrete it picks up portability enters the voids in coarse totals and official of fixings happens. It adds thickness to concrete, since it fills the voids. Denser solid gives higher quality. Quarry tidy may likewise be utilized as a part of place of fine totals as a halfway substitution.

Admixture—The admixtures are the materials other than water, totals and bond added to the solid blend promptly previously or amid blending to change at least one particular properties of cement in crisp or solidified state.

We are utilizing two kinds of admixture—Waste glass powder and Brick clean

Waste glass powder—As we known now daily, a large portion of creating nation confronting deficiency of post customers transfer squander side and it as turn out to be intense issue consequently, recovering and utilizing waste item as assets forestalls condition contamination.

Brick Dust—Brick clean is the waste item which originates from the field where blocks are made and from the devastation misuse of the building. As Brick is thought about of mud which contains adequate measure of solvent silica and alumina finely grounded brick clean when joined with lime demonstrates pozzolanic response. As most punctual said that Brick is the most seasoned and significantly utilized development material so extensive measure of Brick tidy is produced amid assembling of Bricks and pulverization of the constructional structure so it is a noteworthy issue to arrange such a lot of Brick tidy.

II. MIX DESIGN

The requirement forms the basic of selection and proportioning of ingredients are:

The minimum compressive strength required from structural consideration

Workability required for full compaction with the compacting equipment available

III. TYPES OF MIX

Typical Mix: The past detail for concrete endorse the extents of bond, fine and coarse totals. These blends of settled bond total proportion guarantee satisfactory quality, named as ostensible blends.

Standard Mix: The ostensible blend of settled concrete total proportion fluctuates generally in quality and may bring about under or over rich blends.

IS 456-2000 has assigned the solid blends into various evaluations as M10, M15, M20, M25, M30, M35 and M40.

Planned Mix : In these blends, the execution of the solid is indicated by the fashioner yet the blend extents are controlled by the maker of cement.

IV. MATERIAL USED

In directing the trial considers in the lab following materials are utilized.

Concrete : PPC fitting in with Is 1489-1991 section 1 mark name ultratecht bond is utilized as a part of the whole work. Particular gravity of bond is 3.15

Sand: Fine total coming about because of characteristic deterioration of shake and which passes 4.75mm IS strainer and complies with IS 383-1970, zone-2 utilized as a part of whole work.

Coarse total: Coarse total which passes 20 mm Is strainer and held 4.75 mm, normally happening pulverized stone utilized as a part of the work.

Block Dust: Brick bats pulverized in coarse powder frame were utilized as a fine total for making concrete. 5%, 10%, 15% and 20% block tidy is utilized as substitution of sand in the trials.

Glass powder: Glass is broadly utilized as a part of our everyday life through made items, for example, sheet glass, jugs, crystal and vacuum tubing. Glass is a perfect material for substitution. The diverse level of concrete supplanted by glass powder was 5%, 10%, 15% and 20%.

V.METHODOLOGY

After procuring the ingredient for making the design of concrete mix M25 grade was done for natural fine and coarse aggregate and rounded aggregate. Concrete cubes of sufficient number were casted by mixing the different proportions as obtained in the design mix. The workability of concrete mixes was measured by the slump test. Curing of concrete cubes for 7 days and 28 days was done. Three cubes of concrete of size 100x100x100 mm of all designed grades were tested for compressive strength at 7 days and 28 days. Fine aggregate is then replaced by brick dust. Now the workability and compressive strength of concrete at the end of 7 days and 28 days was determined. Cement is then replaced by waste glass powder. Now the workability and compressive strength of concrete at the end of 7 days and 28 days was determined.

VI.RESULTS AND DISCUSSION

Compressive strength

According to May be 10262, blend extent of different materials, for example, bond, sand, total is figured for M25 review of cement. The cube were

tried in the research facility in understanding to code IS 1343-1980. The consequences of compressive strength of cube for 7 and 28 days of different blend extent of cube get ready according to blend configuration are demonstrated as follows:

It is watched that the compressive strength of cube(concrete is mostly supplanted by squander glass powder in squashed total) of M25 blend. Following 7 days, substitution of waste glass powder upto 5%, the compressive strength of cube is increment than the underlying strength acquired from without substitution of bond. Be that as it may, additionally expanded in the rate substitution of brick dust, the compressive quality reductions.

Following 28 days, the compressive strength of cube upto substitution of 10%, it gives great quality yet with greater substitution of waste glass powder lessens the compressive quality.

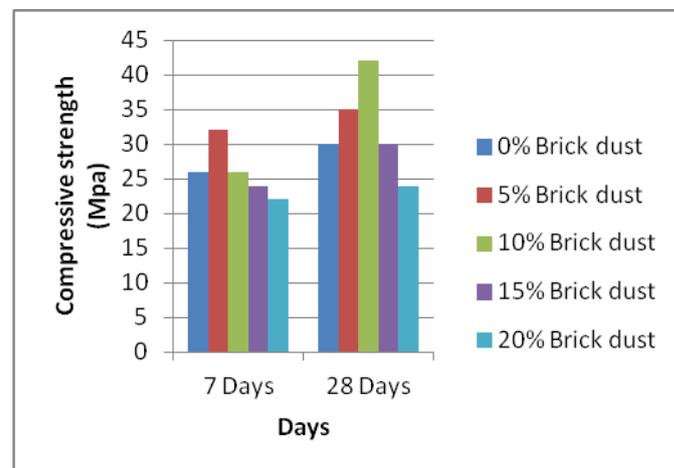


Fig.1 Comparison of Compressive strength of various level of waste glass powder in squashed Aggregate

Compressive strength up to 10% supplanting of waste glass powder with concrete in adjusted total for 7 days, the strength of cube increments, yet greater substitution of wast glass powder the compressive strength abatements.

After 28 days, replacement up to 10% gives more strength than the other percentage replacement of waste glass powder.

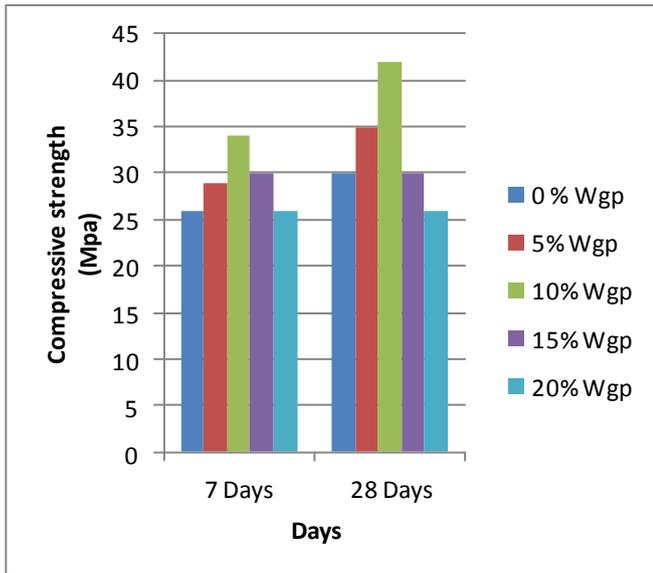


Fig.2 Comparison of Compressive strength of various level of waste glass powder in adjusted Aggregate

The replacement of brick dust with sand in crushed aggregate up to 5%, it will give better strength than the replacement percentage of brick dust as well as without replacement of brick dust both for 7 days and 28 days.

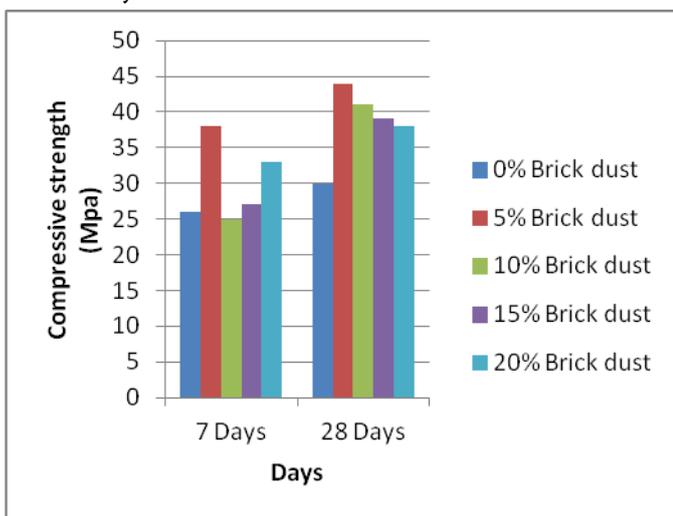


Fig.3 Comparison of Compressive strength of various level of Brick dust in squashed Aggregate

From the result, the replacement brick dust with sand in rounded aggregate, the compressive

strength is more at 10% replacement than the replacement at 0%,5%,15% & 20% after 7 days.

After 28days as the increasing in the percentage replacement of brick dust with sand in rounded aggregate, the compressive strength increases.

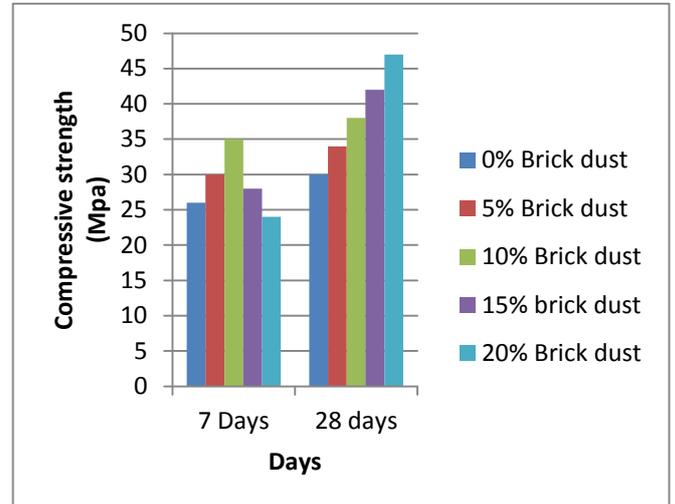


Fig.4 Comparison of Compressive strength of various level of Brick dust in adjusted Aggregate

Workability

The slump test were perform according to IS 1199-1959. The value is presented in graph below:

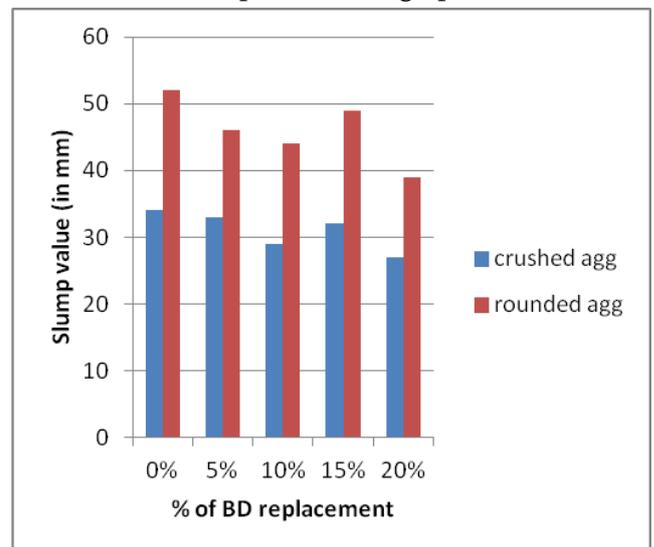


Fig.5 Comparison of droop estimation of various level of Brick dust in adjusted Aggregate and pulverized total

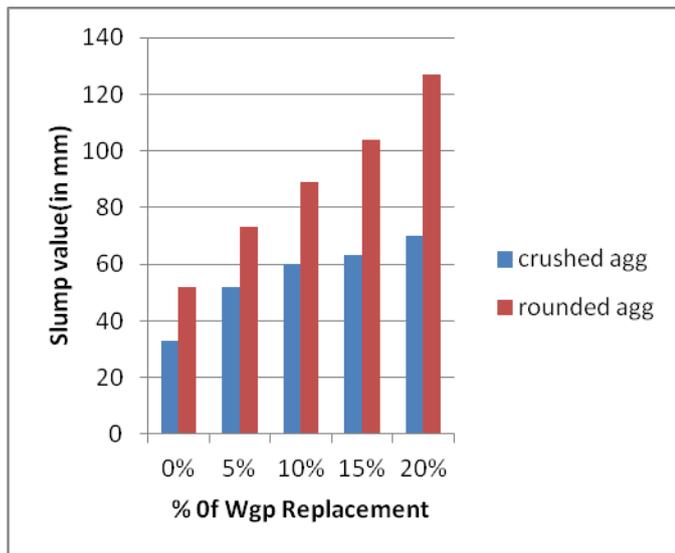


Fig.6 Comparison of droop estimation of various level of Waste glass powder in adjusted Aggregate and pulverized total

The graphs shows that increases in brick dust proportion the workability of the concrete decreases and increasing in the proportion of waste glass powder the workability also increases.

VII.CONCLUSION

On the basis of results obtained, following conclusion can be:

The optimum replacement of waste glass powder with cement in crushed aggregate and rounded aggregate is found to be 10% at which the compressive strength of cube at 7 days & 28 days are higher than those of concrete cube prepared with replacement of 5%, 15% & 20% and without replacement of waste glass powder with cement. Similarly replacement of Brick dust with sand in crushed aggregate is also found to be effective. The optimum replacement is found to be 5% at which the strength of cube at 7 days and 28 days are higher. The result obtained from testing the cubes with brick dust with rounded aggregate gives that the strength at 7 days with replacement of 10% Brick dust gives more strength but after 28

days replacement of 20% gives more strength. Increases in Brick dust proportion, the workability of concrete decreases and increasing in the proportion of waste glass powder the workability also increases.

VIII.ACKNOWLEDGMENT

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