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A Review On Behaviour Of Concrete By Partial Replacement Of Cement With Iron Dust

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ABSTRACT
In our project we deal with the effect of partial replacement of cement with iron dust and then addition of steel fibers. Iron dust is industrial by-products generated from the milling industry and factories. It can be mainly obtain by grinding and lathing of the iron product.
This is a waste material used as a pozzolanic material in concrete to increase durability and strength. It is very important to take appropriate particle size of iron dust. Iron dust replaced with cement so particle size of iron dust is less than 0.75 micron. Steel fiber produced as a by-product from industrial processes. The use of steel fibre has led to the improvement of the concrete mechanical properties such as material toughness in tension and also durability.
Steel fibers are generally utilized in concrete to manage the plastic shrink cracking and drying shrink cracking. The length of steel fibres is 30mm and diameter is 0.75mm and aspect ratio 40. Commercial production of steel fibres for use in concrete is also available now a day.

Based on the Litreature study, the present investigation has an attempt is made to evaluate the workability, compressive strength, split tensile strength and flexural strength on the replacement of iron dust in the percentage of 7% by the weight of cement adding the steel fibres in the percentage of 1.5%, 3%, 4.5%.
Key words: Iron dust, Steel fibre

I. INTRODUCTION

Now these days construction cost is very high with using conventional material. Cement reacts with water and release CO2 gas. We are trying to partial replacement of cement by different kind of material. (Iron dust) and addition of steel fibres which also increases strength, reduces cost and consumption of cement. Investigate the parallel study between replace material iron dust and additive material steel fibers. Find the values of compressive strength, flexural strength and split tensile strength. And investigate the changes in values of their strength properties.

The rapid development of construction industry has increased the consumption of cement. But the production of cement involves the depletion of natural resources and greenhouse-gas emissions. Also production cost of cement is increasing day by day. Thus, there is a need to search for alternative materials to cement for use in the construction.

II. MATERIALS USED

Properties Of Material

- Cement
- Fine aggregate
- Coarse aggregate
- Water
- Iron dust
- Steel Fibres

Cement

The chemical reaction that results when the anhydrous cement powder is mixed with water produces hydrates that are not water-soluble. Non-hydraulic cements must be kept dry in order to retain their strength. The most important use of cement is the production of mortar and concrete, the bonding of natural or artificial aggregates to form a strong building material that is durable in the face of normal environmental effects. 53 grades Ordinary Portland cement is used for the study programme. The properties of this cement have been tested and given below

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Fine Aggregate

Sand is a naturally occurring granular material composed of finely divided rock and mineral particles. The composition of sand is highly variable, depending on the local rock sources and conditions, but the most common constituent of sand is inland continental setting and non-tropical coastal setting is silica, usually in the form of quartz.

For increased workability and for economy as reflected by use of less cement, the fine aggregate should have a rounded shape.

The purpose of the fine aggregate is to fill the voids in the coarse aggregate and to act as a workability agent. River sand was used in preparing the concrete as it was locally available in sand quarry.

Coarse Aggregate

Crushed stone or angular rock is a form of construction aggregate, typically produced by mining a suitable rock deposit and breaking the removed rock down to the desired size using crushers. It is distinct from gravel which is produced by natural processes of weathering and erosion, and typically has a more rounded shape. Angular crushed stone is the key material for macadam road construction which depends on the interlocking of the individual stones' angular faces for its strength.

Water

Portable tap water available in laboratory with pH value of 7.0 ± 1 and confirming to the requirement of IS: 456-2000 was used for mixing concrete and curing the specimens as well. Combining water with a cementations material forms a cement paste by the process of hydration. The cement paste glues the aggregate together, fills voids within it, and makes it flow more freely.

Hydration involves many different reactions, often occurring at the same time. As the reactions proceed, the products of the cement hydration process gradually bond together the individual sand and gravel particles and other components of the concrete, to form a solid mass.

Iron Dust

Iron dust is industrial by-products generated from the milling industry and factories. It can be mainly obtain by grinding and lathing of the iron product. Particle size of iron dust is less than 0.75mm.

Steel Fibre

Steel fiber having low carbon and it's both end were hooked were used. The steel fibers have a length of 30 mm, diameter of 0.75 mm, aspect ratio of 40, and density of 7.85 g/cm3.

The use of steel fiber has led to the improvement of the concrete mechanical properties such as material toughness in tension and also durability. Steel fibers are generally utilized in concrete to manage the plastic shrink cracking and drying shrink cracking. The length of steel fibers is 30mm and diameter is 0.75mm and aspect ratio 40.

III. MIX PROPORTION

General:

Blend configuration is the way toward choosing appropriate elements of the solid and deciding their relative extent with object of delivering concrete having certain base attractive properties like functionality in crisp state least alluring and strength in solidified state.

Table 3.1 Mix Proportions

Mix designation	Mix combinations
CC	C + FA + CA
Mix 1	C + FA + CA+1.5%SF
Mix 2	C + FA + CA+3%SF
Mix 3	C + FA + CA+4.5%SF

IV. EXPERIMENTAL STUDY

4.1.Compressive strength test

Testing of solidified cement is significant for controlling the nature of cement. The fundamental motivation behind testing solidified cement is to affirm that the solid has created required quality. The compressive quality is one of the most significant properties of solidified cement and as a rule it is the trademark an incentive for grouping of cement in different codes.Compression trial of shapes is the most widely recognized test directed on solidified cement since it is a simple test to perform and a large portion of the alluring properties of cement are relatively identified with its compressive strength.The pressure test was completed on cubical example of size 150mm x 150mm x 150mm in a pressure testing machine of limit 1000kN, at a stacking pace of 14N/mm every moment according to IS 516:1959 determination.

4.2.Split tensile strength

The split tensile test is a notable circuitous test utilized for deciding the rigidity of cement. Test was done on solid chamber of size 150mm x 300mm according to IS 5816:1999 particular. In split elasticity test, solid chamber was set with its pivot even, between the stacking surface of a pressure testing machine and the heap was applied until the disappointment happened because of a parting in the plane, containing the vertical width of the example. The split rigidity was resolved for HPC blends following multi day water relieving.

4.3.Flexural Strength

The shafts were basically bolstered at the two finishes with concentrated point stacking framework and the bars exposed to static stacking.The beam of size 0.15 m x 0.18 m x 1.2 m werecast with the following reinforcement 5 quantities of 10mm width bars was utilized as principle support, 2 numbers at top and 3 numbers at base. 8 mm breadth stirrups divided 130 mm focuses were utilized as shear support.

V. CONCLUSION

- In this study, the literature review papers are identified and based on the Concrete behaviour are used to be evaluate with partial replacement of cement by iron dust as 7%.
- With the percentage of iron dust, adding the steel fibre in the percentage of 1.5%,3%,4.5%.
- The strength properties such as Compressive Strength, Split tensile strength & Flexural Strength have to be done in future study.

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