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Performances Based Study On High Strengh Concrete Using Fiber As The Replacement

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Abstract: **Processed sand is increasingly used as an alternative. With the prohibition of sand mining in several states and the increasing demand for river sand for construction work, many civil engineers have expressed the need to promote the use of manufactured sand in the construction industry. Manufactured sand is reportedly used extensively around the world and technicians at major projects around the world insist on the mandatory use of manufactured sand due to its constant gradation and no impurities. Ordinary concrete lacks the required strength and durability often required for large concrete structures such as tall buildings, bridges, and structures under severe exposure conditions. Due to the prosperous construction activities, natural sand has become scarce due to excessive unscientific methods of extraction from the river bed. For these reasons, it is necessary to produce improved concrete with high strength, using suitable materials. This article demonstrates the effective use of the product fibers and M-sand in high-strength concrete.**

Keywords: **Green Heat Of Hydration; Microstructure Sustainability; Ultra-High-Performance Concrete;**

INTRODUCTION:

In recent years, the terminology "High strength Concrete" has been introduced into the construction industry. The American Concrete Institute (ACI) defines high strength concrete as concrete meeting special combinations of performance and uniformity requirements that cannot always be achieved routinely when using conventional constituents and normal mixing, placing and curing practices [1]. A commentary to the definition states that a high strength concrete is one in which certain characteristics are developed for a particular application and environment. Because many characteristics of high strength concrete are interrelated, a change in one usually results in changes in one or more of the other characteristics. A high-strength concrete is always a high-performance concrete. ACI defines a high-strength concrete as concrete that has a specified compressive strength for design of (40 MPa) or greater. More recently, the threshold rose to 50 to 60 MPa. Other countries also specify a maximum compressive strength, whereas the ACI definition is open-ended. Cement**,** in general, adhesive substances of all kinds, but, in a narrower sense, the binding materials used in building and civil engineering construction. Cements of this kind are finely ground powders that, when mixed with water, set to a hard mass. Setting and hardening result from hydration, which is a chemical combination of the cement compounds with water that yields sub microscopic crystals or a gel-like material with a high surface area [2]. Because of their hydrating properties, constructional cements, which will even set and harden under water, are often called hydraulic cements. The most important of these is Portland cement. Aggregates are the important constituents in concrete. They give body to the concrete, reduce shrinkage and effect economy. One of the most important factors for producing workable concrete is good gradation of aggregates. Good grading implies that a sample fraction of aggregates in required proportion such that the sample contains minimum voids. Samples of the well graded aggregate containing minimum voids require minimum paste to fill up the voids in the aggregates [3]. Minimum paste will mean less quantity of cement and less water, which will further mean increased economy, higher strength, lower shrinkage and greater durability. Extending the grading of aggregate to a larger maximum size lowers the water requirement of the mix, so that, for a specified workability and cement content, the water/cement ratio can be lowered with a consequent increase in strength. Experimental results indicated that above the 38.1mm maximum size the gain in strength due to the reduced water requirement is offset by the detrimental effects of lower bond area (so that volume changes in the paste cause larger stresses at interfaces) and of discontinuities introduced by the very large particles. In structural concrete of usual proportions, there is no advantage in using aggregate with a maximum size greater than about 25 or 40mm when compressive strength is a criterion. In case of manufactured sand, the process of attrition through VSI and washing makes the crushed stone sand particles good enough to be compared shape and surface texture of natural sand. It must be noted that properly processed manufactured sand can improve both compressive strength and flexural strength through better bond compared to river sand. Rock crushed to the required grain size distribution is termed as

manufactured sand (M-Sand). In order to arrive at the required grain size distribution the coarser stone are crushed in a special rock crusher and some of the crushed material is washed to remove fines [4]. This investigation is an attempt to evaluate the characteristics of mortar and concrete using m-sand as fine aggregate. For the purposes of comparison characteristics of mortar and concrete with river sand has also been explored.

RELATED STUDY:

Mixing with M sand as 100% fine aggregate gives an initial workability of 170 mm, which is much higher than mixes containing 100% river sand (RS) and grinding powder. The high coefficient of purity, particle classification, shape, texture and fine grain control all contributed to improving the workability of the manufactured sand [5]. The good physical properties of the sand also made it possible to reduce free water. The effect of the use of processed sand on the early and long-term volumetric properties, such as shrinkage and creep, respectively, is not available and should be studied. The standard mix containing 100% river sand showed a compressive strength of 49 MPa, 7.5% less than that of the processed sand.

An increase in compressive strength and tensile strength was observed for both standard concrete and fiber-reinforced concrete when exposed to a temperature of 500 ° C. In the range of 50 to 800 ° C, the Ultimate breaking strength of both standard concrete and standard fiber reinforced concrete is the same. Fiberglass paper is suitable for use in concrete, which makes the tensile strength of concrete cubes and cylinders for all mixes exceed that of conventional concrete. Significant improvement in compressive strength with an increase in the percentage of substitution of natural sand for glass of mud sand. Replacing fine aggregate with bottom ash dust easily equalizes the developmental strength of normal concrete at different ages [6]. Factory sand itself is a suitable alternative to river sand at an affordable cost. The synthesized sand was found to have good gradation and a good finish lacking natural sand and this resulted in a well bonded cement mortar. The initial setting time of this cement mix is extended to 100 minutes, allowing sufficient time for mounting, placing and perfect finishing of concrete on site. Cement concrete mixed with a mixture of ordinary Portland cement, high alumina cement, M sand, and coarse aggregate with Complots SP430 super plasticizer was developed for the purpose of accelerating initial strength and long stabilization time. The initial setting time of this cement mix is extended to 100 minutes, allowing sufficient time for mounting, placing and perfect finishing of concrete on site. As can be seen in Table 5, the average compressive strength for 7 days for concrete is a maximum when 1.5% glass fibers are used in a lower or higher proportion, a decrease in strength of approximately 15 % to 20%, however, within 28 days, the strength decreases by 5% to 10%, and based on this result, increasing the weight of fiberglass in normal concrete affects the cohesion between the particles of concrete and this leads to a deterioration in compressive, flexural and tensile strength.

METHODOLOGY AND MATERIALS:

For aggregates, the aggregate mineral of concrete is final products while for the aggregate mineral they can be modified during the production process. One of the main important factors for mobile. This cycle resulting from the crushing of basalt stones and river sand is the main natural source of fine aggregates in our country. And business relationships are in the realm of intense business related to environmental threats. When producing road construction materials. Is M sand defined as a fine aggregate disease? The raw material for the production of sand M is the original mass of rocks. It is based on chemical rocks that will change in chemistry, mineralogy, texture and composition of the sand.

Si. no.	Property	Value
1	Specific Gravity	2.68
2	Fineness modulus	5.2
3	Water Absorption	7.0%
4	Surface texture	Smooth

Table: 3.1 Properties of M-Sand

EXPERIMENTAL ANALYSIS:

Standard size 150mm x 150mm x 150mm cubes, 100mm diameter x 200mm size cylinders were used to find the compressive and tensile strength of the concrete. The samples were placed on the bearing surface of the 200 ton compression testing machine (CTM) without drift and a uniform loading rate was applied until the samples failed. The maximum load is observed and the compressive and tensile strengths have been calculated. To determine the average compressive and tensile strength, in the current job, 3-3-3 cubes and cylinders of ordinary cement concrete with glass, polypropylene and Recron3s fibers are tested under the compression testing machine. Through the experimental study that was carried out, it was observed that when using fibers in concrete, they improve both the tensile and breaking strength in the concrete. This trend is observed with fiber content ratios of 0.5% at all ages. In addition to Recron 3s cement matrix fiber, both strengths will

increase compared to other fibers, leading to an economical result.

Fig. 4.1 General View of Failure Pattern of Control RC Beam

CONCLUSION:

The workability of the concrete was increased and the stagnation values were reduced because the manufactured sand was more water absorbent compared to river sand. Increase the workability in concrete by adding a percentage of additives like Super Plasticizer. This operability also increases the minimum values. Therefore, an alternative chemical mixture is used in the processed sand and increases the stagnation values. The compressive strength of PPC M60 concrete. The results showed that the compressive strength for 7, 28 and 56 days ranged between 39.88, 53.33 and 61.56 MPa, respectively. River sand is 100% replaced with sand formulated to meet M60 grade concrete requirements. The tensile strengths of 7, 28 and 56 days of the concrete ranged between 3.20, 4.34 and 5.86 MPa, respectively. The corresponding flexural strength for 28 days is 16 MPa. River sand appears to have been 100% replaced with sand manufactured to meet M60 grade concrete requirements.

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