

COMPARATIVE AND EXPERIMENTAL INVESTIGATION OF CONCRETE WITH IRON GRAINED POWDER AND SUPER PLASTICIZER

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ABSTRACT

The adverse effects of elevated temperatures on the properties of the fresh concrete include increased water demand, shorter setting time and increased slump loss. Super Plasticizer (SP) is important to enhance the workability and setting time of concrete under hot weather, hence, an experimental investigation was conducted to determine the effect of dosage of the mentioned admixture. Concrete mixes with SP along with iron powder dosages of cement were prepared, together with two control mixes (water/cement ratio were 0.56 and 0.66 respectively). After casting, normal curing was carried out on the concrete samples. Properties such as compressive strength, porosity, water absorption, permeability and initial surface absorption were determined, besides determining the workability and setting time of the fresh concrete. Over dosage of SP were found to deteriorate the properties of concrete with indication of lower compressive strength and higher porosity. However, if the dosage levels are lower than the optimum dosage, increase in admixture dosage might help to enhance the concrete characteristics.

KEY WORDS: Super Plasticizers, Cement, Concrete, Iron Grained Powder and Admixtures Dispensers.

1. INTRODUCTION:

Today, the main emphasis of materials science in sustainable civil engineering world is on enhancing the performance and functionality of conventional materials in environmentally friendly way using recent technologies and local waste materials. As a prime composite construction materials has led to serious environmental effects such as economical unbalances, resource shortage, biodiversity loss, habitat destruction, and desertification.[1] Various levels of silica fume and Metakaolin in GGBS ternary concrete were evaluated. A short term study was carried out to examine the strength development and permeation characteristics of ternary concrete compared to GGBS binary and Portland cement concretes up to the age of 28 days. Mix proportions were designed at 0.35, 0.50 and 0.65 w/c. The studies shown that GGBS ternary concrete show better performance compared to GGBS binary concrete and Portland cement concrete. 10% silica fume addition exhibits better strength development and low capillary suction.[2] It is focuses on a new material called

Metakaolin, which is an industrial by-product. The concrete using Ground Granulated Blast Furnace Slag (GGBS) has some disadvantages like as lower initial strength and higher dry shrinkage. In the previous study, concrete using Metakaolin with GGBS has been confirmed to improve the performance of GGBS concrete without compromising the durability aspects. However, concrete with both Metakaolin and GGBS have not been studied under actual environment. Therefore, in this study, long term durability of concrete made with Metakaolin and GGBS under marine environment has been investigated. From the experimental results, it is found that GGBS concrete with Metakaolin has good resistance against chloride ingress when compared to GGBS concrete even though the resistance against carbonation is lowered slightly in actual environmental conditions.[3] The strength parameters of concrete made with partial replacement of cement by silica fume using super plasticizer is investigated. Properties of hardened concrete like ultimate compressive strength and split tensile strength have been determined for different mix combinations of materials and these values are compared with the corresponding values of conventional concrete.[4] The effects of super plasticizer on fresh and hardened concrete were investigated. The experiment program included test on workability, slump loss and compressive strength. In this experimental works we are comparing the properties of super plasticizer and iron grained powder based concrete with that of without super plasticizer added concrete. Super plasticizer permitted a significant water reduction while maintain the same workability. Super Plasticizers and iron grained powder is same for all mix proportions. Also, we have replaced fine aggregate in

different proportions with foundry sand. We have investigated compressive strength, split tensile strength and flexural strength for all different cases. The HPC mix, grade M60 concrete is designed as per Indian standards "Guide for selecting proportions for high strength concrete with Pozzolana Portland cement and other cementitious materials". The effects of super plasticizer and iron grained powder on fresh and hardened concrete were investigated. The experiment program included test on workability, slump loss and compressive strength. In this experimental works we are comparing the properties of super plasticizer and iron grained powder based concrete with that of without super plasticizer added concrete. Super plasticizer permitted a significant water reduction while maintain the same workability.

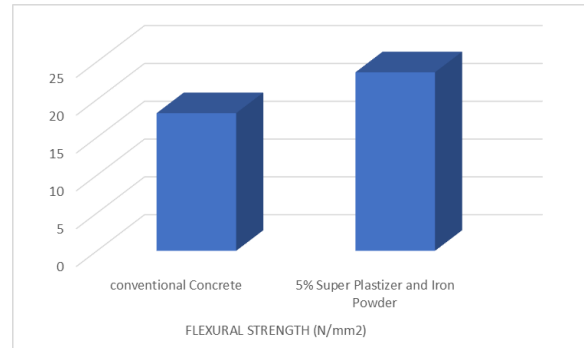
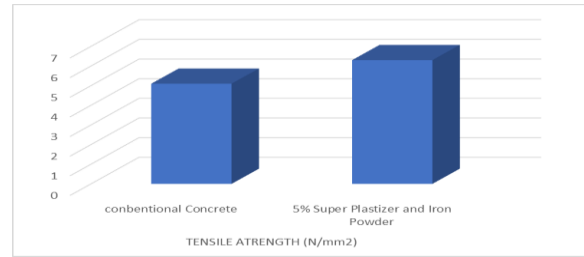
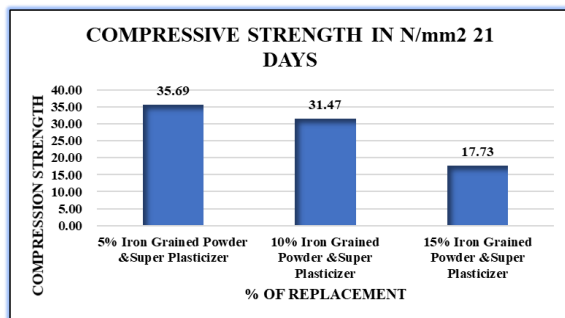
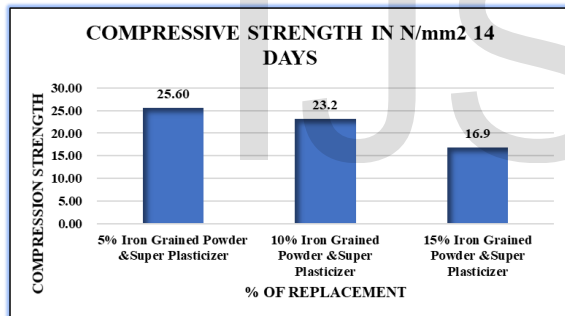
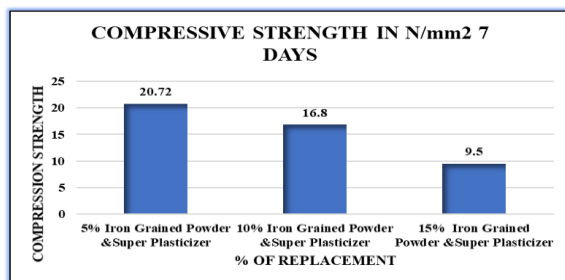
2. MATERIAL AND METHODS

Super plasticizer and iron grained powder can be used in concrete to improve its strength. The polymers employed to improve the efficiency of the flow of suspensions by decreasing the aggregation of particulates are known as super plasticizers. They are mainly used as admixtures in concrete to enhance its strength. Concrete super plasticizers are segmented into five product types – sulfonated naphthalene formaldehydes, poly carboxylic acids, sulfonated melamine formaldehydes, lingo sulfonates, and others. The market can be further classified on the basis of application into ready mix, precast, self-compacting, and high performance. It is used along with concrete.

3. RESULT AND DISCUSSION

In order to assess the performance of the Iron Grained Powder and Super Plasticizers

Concrete in compression test, flexural strength and tensile test was conducted in the sample members casted with 5%, 10% and 15% of Iron Grained Powder and Super Plasticizers adding with the Concrete for 7 Days, 14 Days, and 28 Days. Here the members are cast into Cubes, Prisms and Cylinders for compression, flexural and tensile tests respectively. The results of the test are given below.



4. CONCLUSION:

Based on the 7, 14 & 28 days test results, the following conclusions were made:

This work focuses on the effect of super plasticizer and iron grained powders on Concrete. An Increase in the dosage/percentage of complast SP 561 and iron grained powder resulted in a decrease in the workability and compressive Strength of the self-compacting concrete. While despite the increase in dosage of complast SP 430 all the percentage mix had a satisfactory performance in the fresh and an increase in compressive strength with respect to the curing age respectively. In general, the use of super plasticizer and iron grained powder improves the performance of self-compacting concrete in the fresh state. Through all the super plasticizer used for the study it was observed that complast SP 430 is a better super plasticizer than the rest of the super plasticizer selected the fresh and hardened result acquired.

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