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BEHAVIOR OF IRON SLAG CONCRETE

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Abstract: ***This study has as a goal to present the results of experimental investigations on the behavior of concrete when mixes with iron slag. Recycling of materials has become a major interest for engineers. At present, the amount of slag deposited in the storage yard adds up to millions of tons/years, leading to the occupation of farmland and serious pollution to the environment, as a result of the rapid growth in the steel industry. Iron slag is made at 1500- 1650°C having a honey comp shape with high porosity. Using Iron slag as the natural aggregate with a lower waste material cost can be considered as a suitable alternative for sustainable constructions.***

Index Terms - **Iron Slag, Mechanical Properties, Industrial Waste, Natural Aggregate, Compressive Strength.**

I. INTRODUCTION

The history of the use of Iron and Steel slag dates back a long way. European slag Association (2006) has reported about the earliest reports on the use of slag, where in it is mentioned that t Aristotle used slag as medicament as early as 350 B.C. Awareness of environmental consideration and more recently the concept of sustainable development extensive research and development has transformed slag into modern industrial product which is effective and beneficial. This work presents results from the experimental assessment of the effect of iron slag on mechanical properties of concrete and has as a main goal to contribute to establish design parameters for the recovery of structures.

II. NEED OF THE STUDY.

Iron-filing is a waste material that may have potential uses to stabilize concrete. It can enhance the mechanical properties of concrete. Iron filing is produced in a huge amount due to extensive use of steel in construction industry. Due to growing concern with environmental issues and increasing interest in conservation of energy and resources, every country has to face the challenging problem that how to use or dispose this by-product within the framework of its economic structure.

III. Industrial waste materials

By using the locally available materials, including industrial waste it could be possible to reduce the cost of construction. Several types of new materials are tried to establish the efficiency of new materials in construction. Traditionally cement, course aggregates, sand, etc. are used for construction. Natural materials being exhaustible in nature, its quantity is declining gradually. Also, cost of extracting good quality of natural material is increasing. Concerned about this, the scientists are looking for alternative materials for construction and industrial waste product is one such category. If these materials can be suitably utilized in construction the pollution and disposal problems may be partly reduces.

IV. Iron Filling

As the name suggests, iron filings were traditionally obtained from metal working operations as the scrap material filed off larger iron and steel parts. They are very often used in science demonstrations to show the direction of a magnetic field.
Physical properties of iron fillings: -

PROPERTIES	VALUE
Fineness Modulus	2.24
Specific Gravity	3.95
Density	1946 m^3

Table 1: Physical properties of iron slag

Figure 1: Iron Slag

V. OBJECTIVES

1. To determine the effect of adding iron filling on the concrete properties.
2. To Enhance the mechanical properties of concrete
3. To estimate the suitability of Iron Slag as a partial replacement of natural sand in concrete.
4. To determine the Slump cone test, Compression test and spilt tensile test on concrete after adding Iron Slag.

VI. RESEARCH METHODOLOGY

This study has as a goal to present the results of experimental investigations on the behavior of concrete when fine aggregate is replaced with iron slag. A concrete of common utilization in our region, with cement and usual aggregates mixed in usual proportions (mix), was mixed with different proportion of Iron slag 5%, 10% and 15%, in order to assess probable variations in its compression strength, tensile strength and deformation module. The probable recovery of the mechanical properties under investigation following concrete rehydration – after a possible reduction from the effects of the high temperatures applied – was also assessed; test bodies were submitted to high temperatures and cooled slowly; a few were immersed in water and then evaluated in relation to the researched properties for concrete ages of 7, 14, and 28 days after slow cooling. Upon finishing this work, important results on the effect of high temperatures on concrete mechanical properties was obtained, thus providing a major contribution for the recovery design of structures.

VII. CONCLUSIONS

Based on the literatures that I had studied Iron Slag is the best waste material to replace natural sand or fine aggregates. Following are the conclusions that we made from the study:

1. To find the optimum percentage of replacement we have to study compressive strength, split tensile strength, and flexural strength of concrete.
2. We get eco-friendly concrete as it subsidizes the stagnation of Iron Slag and the cost of concrete will be saved.
3. According to the literature, that we have studied optimum strength will be achieved at 15% replacement of Iron Slag

VIII. ACKNOWLEDGMENT

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