

# Study on Properties of Concrete by Adding RHA and Granulated Blast Furnace Slag as Partial Replacement of Cement and Sand

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## ABSTRACT

In this study use of granulated blast furnace slag in partial replacement of sand from 0% to 20% and cement 20% by Rice Husk ash M30 grade were prepared and the different strength parameters i.e. compressive strength, tensile & flexure strength. Partial substitution of Copper waste in concrete with shows good resistance to sulphate attack. Cost of Concrete production reduces when granulated blast furnace slag is used as a fine aggregate in concrete as replacement.

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## INTRODUCTION

An investigation relating to the use of by products to enhance the functions of concrete has been about for many years. In the recent years, the researchers have been made to use industry by-products such as fly ash, silica fume, ground granulated blast, GBFS and RHA etc., in concrete production and civil applications. The potential uses of industrial byproducts in concrete or as a partial aggregate substitution or as a partial sand and cement substitution depending on their chemical composition and grain size, The utilization of these materials in concrete comes from the environmental constraints in the safe disposal of these products. Big interest is being focused on the environment and safeguarding of natural resources and recycling of waste materials.

Infrastructural improvement plays a significant task in the development and improvement of any country or society. This competence is accompanied by

construction, remolding, maintenance and demolition of buildings, roads, subways and other structural establishments.

## GRANULATED BLAST FURNACE SLAG

**Ground-granulated blast-furnace slag (GGBS or GGBFS)** is obtained by quenching molten iron slag (a by-product of iron and steel-making) from a blast furnace in water or steam, to produce a glassy, granular product that is then dried and ground into a fine powder. Ground-granulated blast furnace slag is highly cementitious and high in calcium silicate hydrates (CSH) which is a strength enhancing compound which improves the strength, durability and appearance of the concrete.

## Objectives

- To study the properties of fresh concrete and harden concrete prepared by replacement of GBFS and rice husk ash.

**WORKABILITY TEST**

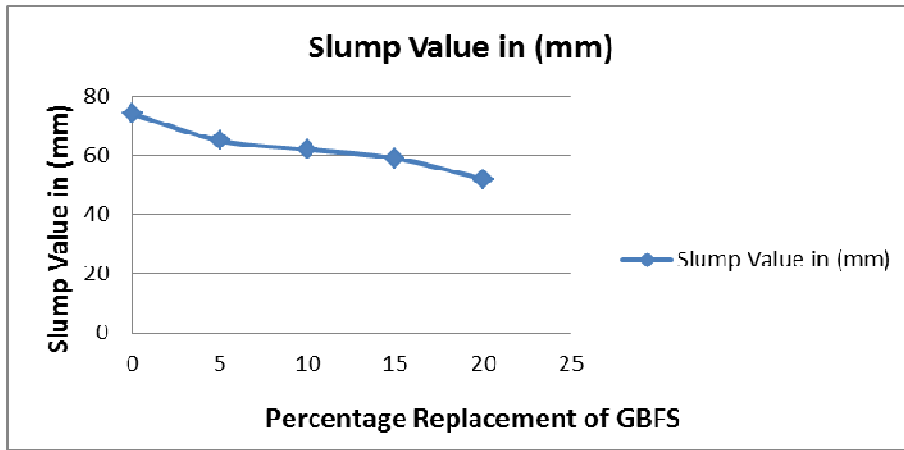


Figure 1 shows the line graph of Slump value in mm with 20% RHA

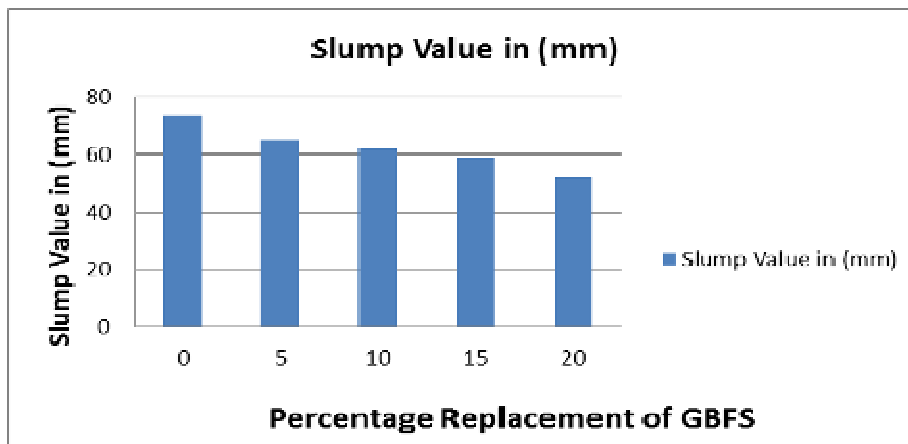


Figure 2 shows the bar chart graph of Slump value in mm with 20% RHA

**COMPRESSIVE STRENGTH TEST**

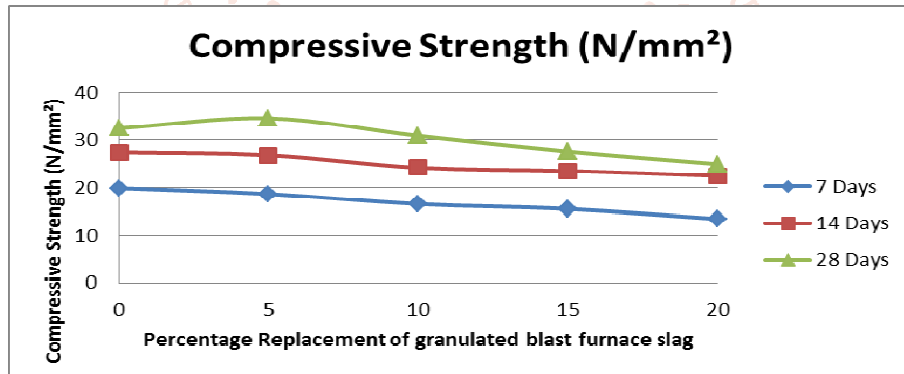


Figure 3 Shows line Compressive Strength of M30 Mix cubes at different curing stages with 20% RHA

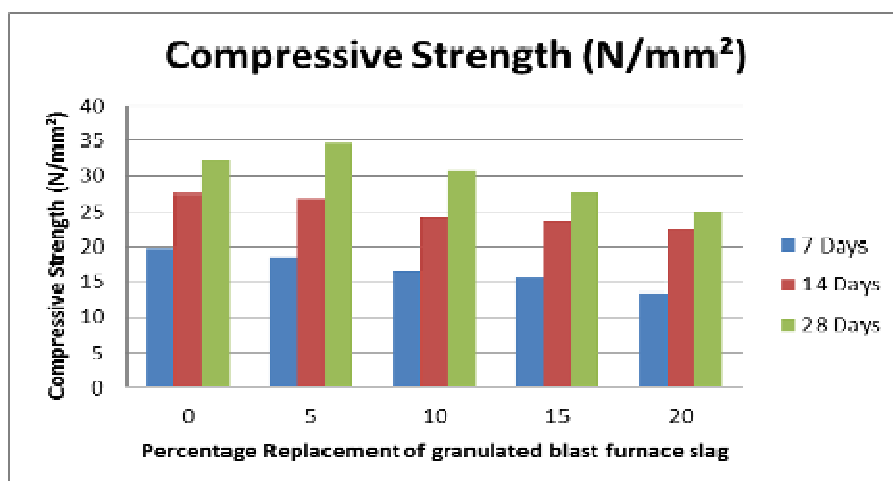
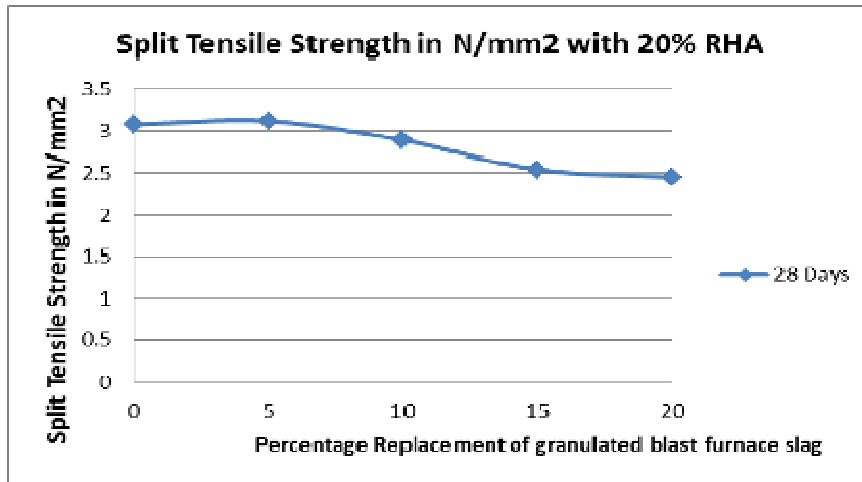
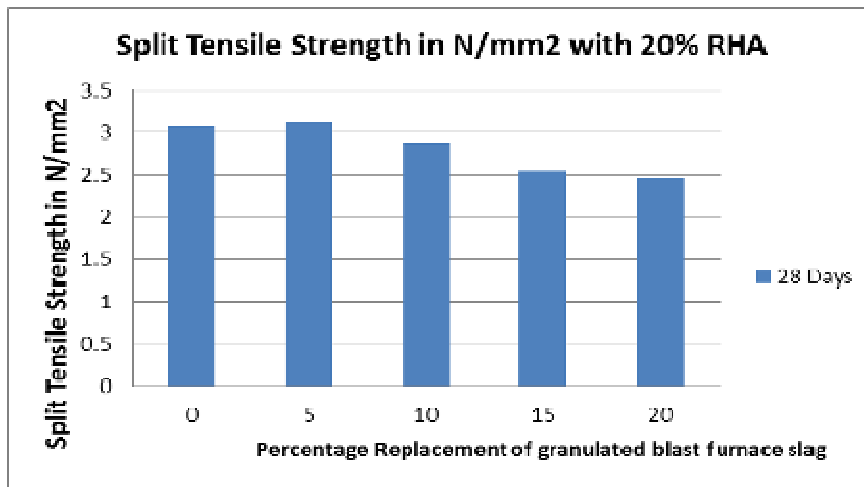


Figure 4 Shows bar graph of Compressive Strength of M30 Mix cubes at different curing stages with 20% RHA

**SPLIT TENSILE STRENGTH TEST**

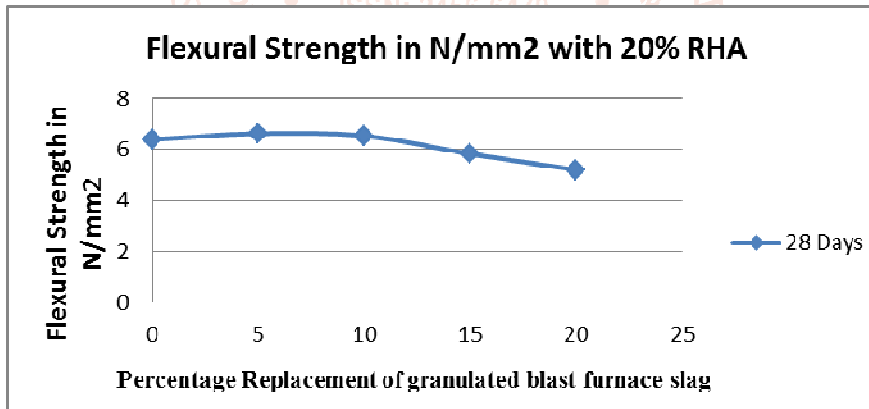


**Figure 5 Split Tensile Strength at 28 Days**

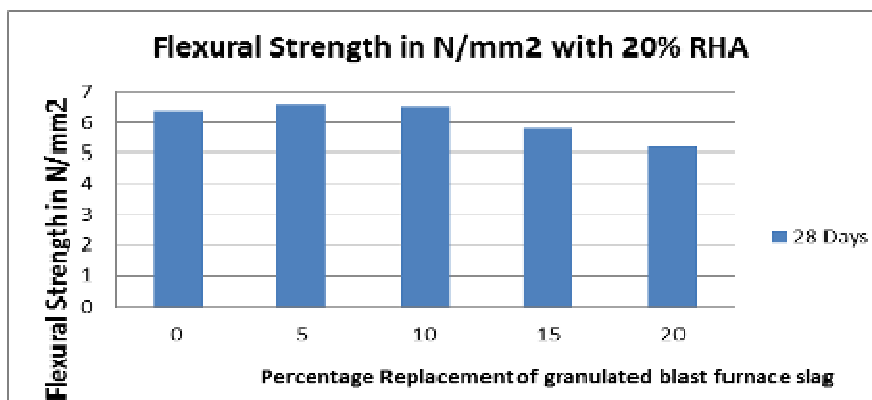


**Figure 6 Split Tensile Strength at 28 Days**

**FLEXURAL STRENGTH**



**Figure 7 Flexural Strength at 28 Days**



**Figure 8 Flexural Strength at 28 days**

## CONCLUSIONS

- The utilization of GBFS in concrete provides additional environmental as well as technical benefits for all related industries. Partial replacement of GBFS in fine aggregate reduces the cost of making concrete.
- The Compressive Strength of M-30 solid mix increments from 32.43 N/mm<sup>2</sup> to 34.52 N/mm<sup>2</sup> on expanding the level of granulated blast furnace slag (from 0% to 5%) with 20% RHA.

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