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Experimental Investigation on Waste Utilization of Steel Fiber and SCBA in Concrete with Partially Replacement of Cement

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Abstract: ***In the present study the effect of Suarcane bagasse ash and steel Fiber on the strength of concrete is investigated. The addition of bagasse ash not only helps in reducing pollution but also leads to sustainable development of the country. From the literature it has been observed that bagasse ash significantly increases the strength of concrete and it can be used as a partial replacement of cement in the concrete. In these trial examination work concrete cubes, cylinders and beams of M-25 grade were casted and tested to inspect different properties of concrete like compressive strength, flexural strength and split tensile strength test. The test results shows that Sugarcane Bagasse Ash can be utilized for partial replacement of cement up to 10% by weight of cement without any major loss in strength.***

Keywords: Steel fibres, Cement and Compressive Strength, GGBS, Fly Ash, SFRC, Cement, , Split Tensile Strength

I. INTRODUCTION STEEL FIBERS AND BAGASSE ASH

A. Steel fibers

Steel fibre concrete is a type of specialty concrete that combines regular concrete with discrete steel fibres. During the concrete mix, a large number of small-scale fibres are distributed randomly. Steel fibres are gradually replacing and reducing the typical reinforcement bar in concrete components in the field. As a result, steel fibres tend to increase the tensile strength of concrete by deflecting tiny fissures that form in the concrete as a result of external forces and loads. Steel fibres are normally small and short in length in order to prevent the concrete mixture from becoming too hard to work.

B. Bagasse Ash

Bagasse ash produced from the various sugarcane industries is not only hazardous in causing air pollution but also creates troubles in land disposal. Mostly the industrial and agricultural wastes are dumped in the nearby land and this affects the natural fertility of the soil.

Steel Fibres and Bagasse

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II. LITERATURE REVIEW

A. Literature Review

Hossain et al. (2006). It was observed from the test results that the replacement of cement by 50% fly ash disclosed greater resistance to high temperature. Further, it was revealed in this investigation that the compressive strength and bond strength of cement mortar with different percentages of fly ash initially increased with the increase in temperature but beyond 2000C the compressive strength started to decrease due to the increase in temperature.

Piyush Kumar and Anil Pratap Singh (2015) states that the partial replacement of cement by BA in the ratio of 0%, 5%, 10%, 15% and 20% by weight of cement with various experiments. The 7 days and 28 days test results indicate that the strength of concrete is increased with the optimum usage of 10% replacement of cement by bagasse ash.

Manju Priya et al. (2020) regarding the durability properties of HRSCC with partial replacement of cement by SCBA with 5%, 10%, 15% and 20% with additional of polypropylene fibre of 0.05% and 0.10 %. In this study, 2% Glenium super plastizer was used with W/P ratio of 0.32%. This paper indicates that the addition of two or more types of fibre in hybrid SCC concrete

III. OBJECTIVE

The objective of this experimental study is to:

A. Main aim of this experimentation is to find the effect of replacement of cement by SCBA and SF on workability and strength characteristics of concrete.
B. To determine the fresh property i.e. workability of M25 grade concrete by partially replacing cement with SCBA& SF.
C. The objective of this study is to search alternatives material, which can fully or partially replaced naturally available material in construction.

IV. MATERIALS AND METHODOLOGY

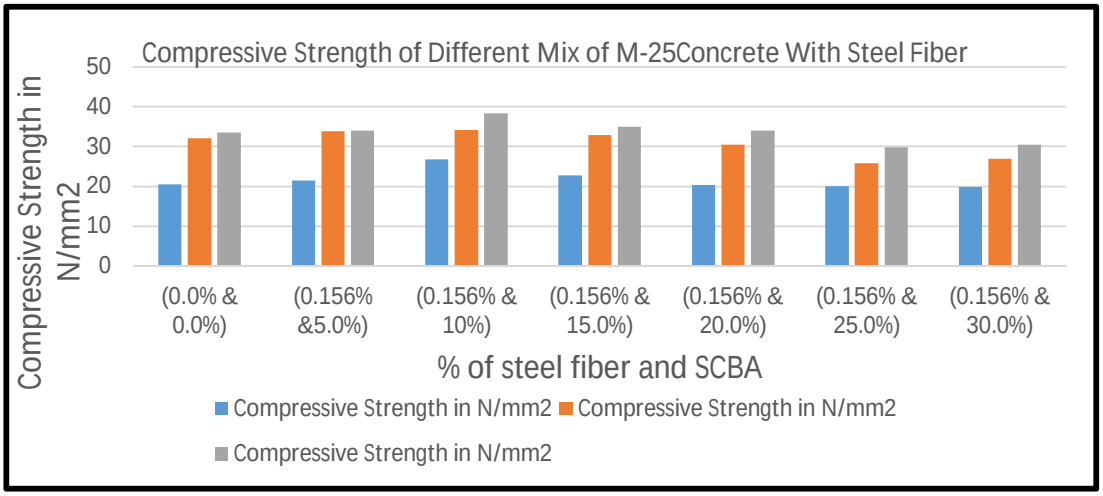
A. Material

1) Cement
2) Fine aggregate
3) Coarse aggregate
4) Water
5) Admixtures
6) Steel fibres
7) SCBA

V. EXPERIMENTAL RESULT.

A. Compressive Strength Test

The effect of Steel fiber and SCBA used in the present study on compressive strength of concrete for M25 grade of concrete with varying dosages as 0%, 5% ,10 % ,15% 20%, 25%, and 30% by SCBA and constant rate .156% steel fiber replacing cement by v/eight and at 7 days, 28 days and 56 days has been shown in Graph



Compressive Strength of Different Mix of M-25 Concrete at 7,28and 26 days at different Percentage of SF and SCBA

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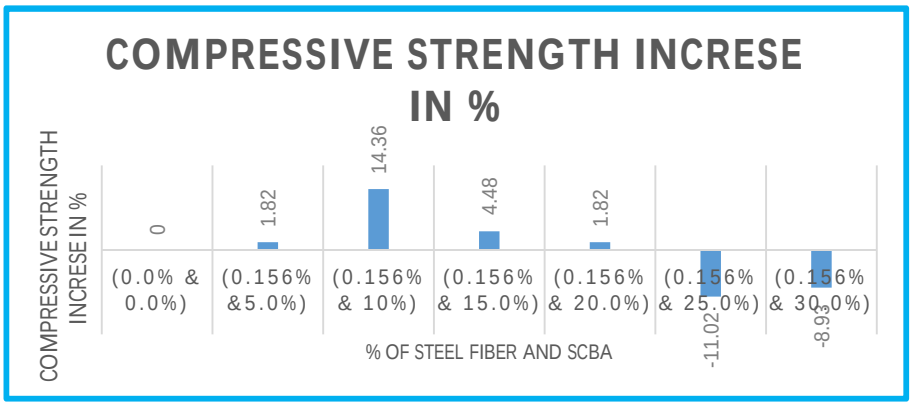
- *Discussion:* After increase the percentage of SCBA strength decreases ,optimum percentage of SCBA is 10% which give maximum value of compressive strength. In case of cement replace by SCBA & SF the maximum value of compressive strength 38.3 N/mm2.

B. Variation of Compressive Strength of SCBA Steel Fibre Reinforced Concrete at 28 days



Varying of compressive strength at 7,14and 28 days by using steel fiber and SCBA

- Discussion: From the Experimental test results, it is observed that the optimum compressive strength is obtained with the mix proportion (.156% & 10%) at the end of 56 days. The compressive strength of N2 is 38.3N/mm2 at the end of 56 days. Thus, it can be anticipated that, there is an increase of 14 .3 % in the compressive strength of with the .0 156 % addition of steel fiber and 10% replacement of SCBA in the nominal concrete.

VI. CONCLUSION

1) From the experimental studies the percentage of bagasse ash increases the compressive strength of concrete up to certain percentage replaced by weight of cement and then the strength of concrete gets decreased with increasing of bagasse ash. The inclusion of Sugarcane Bagasse Ash (SCBA) is replaced by weight of cement in the various percentages of0% to 30% with and without addition of steel fibre. The results for compressive strength of concrete were obtained at 7, 28 and 56 days, respectively.

2) From the Experimental test results, it is observed that the optimum compressive strength is obtained with the mix proportion N2 (.150% & 10%) at the end of 56 days. The compressive strength of N2 is 38.3N/mm2 at the end of 56 days. Thus, it can be anticipated that, there is an increase of 14 .3 % in the compressive strength of with the .0 156 % addition of steel fiber and 10% replacement of SCBA in the nominal concrete.

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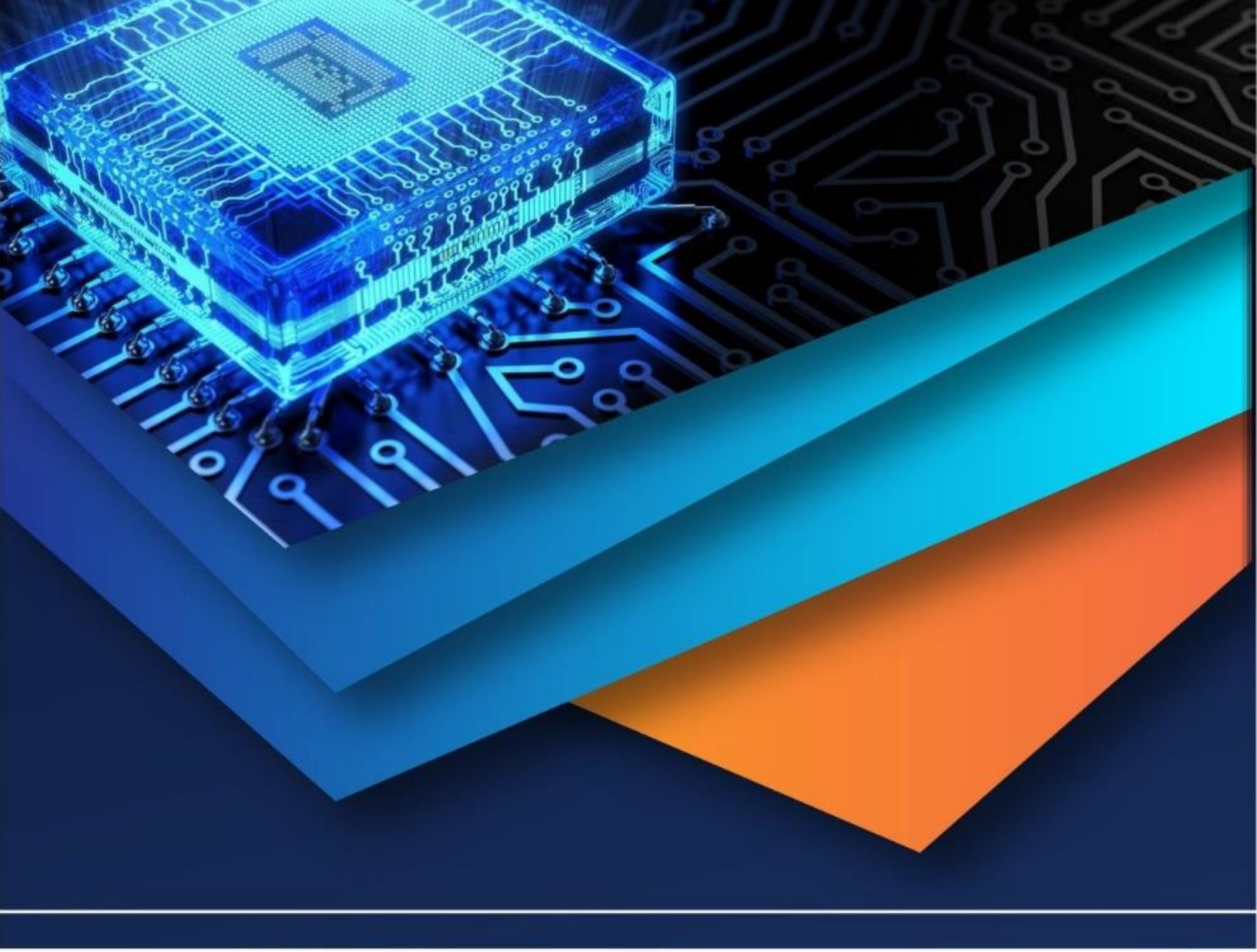

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