A Review Paper on Self Compacted Concrete By Replacing Partially Cement With Bagasse Ash

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Abstract- *This review paper on self-compacted concrete emphasises on concrete with partially replacement of cement with the waste material sugarcane bagasse ash. Large amount of ash is produced during the manufacturing of sugar. To remove this ash land fill method is used but it creates many problems. To control these problems it is used in concrete as replacement of cement. Large amount of silica is present in bagasse ash which is required to make C-S-H gel in concrete. Cement is replaced with bagasse ash in different proportion 0%, 6%, 12%, 18% by weight of cement. The main objective of this research is*

1) *To made SCC economical by partially replacement of cement with bagasse ash.*
2) *To utilize the waste by using ash in different proportions in preparing SCC.*
3) *To determine the characteristic strength of self-compacted concrete.*
4) *To find how much percentage of bagasse ash does not have any adverse effect on concrete.*

Keywords- Self-Compacted Concrete, Bagasse Ash, and Characteristic strength, Super plasticizers.

I. OUTLINES

1) Most of the study is done on M - 25 grade of concrete by using grade of cement OPC 53 but in this research OPC 43 is used.
2) In this study cement is replaced with bagasse ash in different proportion 0%, 6%, 12%, and 18 %.
3) Water cement ratio 0.4 is used and the dosage of super plasticizers is 1.3% of cement.

II. INTRODUCTION

Self-compacted concrete is a concrete which is already compacted by itself or without any external vibrator. Self-compacted concrete is a composite material of cement, sand, aggregates, and super plasticizers and exhibit various properties such as resistence to segregation, passing ability and filling ability. Self-compacted concrete possess both fresh and mechanical properties. Fresh properties such as workability which is determined by performed various test such as Slump Cone Test, V-Funnel Test, L-Box Test and J-Ring Test. The mechanical properties such as compressive strength which are determined by compressive testing machine. To make Self- Compacted Concrete EFNARC specifications is followed. In SCC the size of aggregates is limited. The maximum size of aggregates in SCC is 20 mm. If we increase the size of aggregates then segregation will occurs in concrete. Different type of super plasticizers is required in SCC. Example HRWR, VMA. HRWR is a used to reduce the yield stress and viscosity modified agent is used to maintain viscosity and also to stabilize the rheology of self-compacted concrete. Self-compacted concrete is also known as Self Workable concrete, self –levelling concrete.

SELF- COMPACTED CONCRETE

III. LITERATURE REVIEW

M. Siva Kumar, Dr .N. Mahendran (2013):-

This research includes analysis of cost and experimental studies of concrete using bagasse ash. For this research OPC grade 33 was used. They replace the cement in different proportion 0%, 10%, 20%, 30%, 40%. The chemical analysis of bagasse ash and OPC was determined as per IS code 4032-1985, 1727-1995. Bagasse ash was heated at a temperature around 800 to 1000 for 20 minutes and sieved through 90 micron meter. The pozzolanic activity is conducted by 1g of material and saturated with a lime solution (75 ml) for 1, 7 28 days. The pozzolanic behavior is maximum 3 to 7 days. Flame photometer is used to carry out the chemical

analysis of bagasse ash. M20, M25 mix was prepared as per standard procedure. The density, specific gravity and mean grain size of bagasse are found to be less than OPC. 20 % replacement of cement gives better results. The maximum compressive strength at 28 days is 23.45 for M25, 18.76 for M20.

BAGASSE ASH

Gritsada Sua –iam, Natt Makul (2013):-

This paper investigates the interactions between the bagasse ash and Limestone when bagasse ash is used as a partial replacement of fine of fine aggregates. The major phase of limestone is calcite and quartz in bagasse ash. Grade 33 ordinary portland cement was used. To minimize the water cement ratio 2% polycarboxlyic ether was used as a high range water reducer. If limestone is added then it improves the rate of hydration of cement and increases the density of the paste matrix and improves the concrete performance. Due to greater surface area and porous nature of the particles of bagasse ash the required amount of water is increased. The amount of water is reduced by using limestone. If we use small size of limestone then density increases. The compressive strength is maximum 65 Mpa at 28 days, 82.8 after 91 days. Ultrasonic pulse velocity decreased due to large amount of bagasse ash. To increase the ultrasonic pulse velocity limestone was added. When 2 % of super plasticizers was added then the slump value was 580 mm.

Dr. D. B. RAJIWALA (2015):-

They carried out an experimental study by using sugarcane bagasse ash in concrete when cement is partially replaced 5% by weight. They compare the effect in the strength on grade of concrete M 25 when the cement is replaced by 5% of weight with sugarcane bagasse ash concrete and normal concrete.

MAHAVIR SINGH RAWAT (2015):-

They study to investigate the effect on the fresh and hardened mechanical properties of self- compacted concrete when OPC is partially replaced by 10% of sugarcane bagasse ash. They heat the sugarcane at a temperature of 700-800 until the particle is passing through the sieve of 150 micron. SP430-SRV super plasticizer was used. Mix design concrete was done according to Indian Standard for M 20 Grade and kept water-cement ratio is 0.5. They replace the cement partially in different ratio of 0%, 10%, and 15% by weight of cement. The specific gravity of aggregate is 2.60 and fineness modulus is 2.59. They perform different types of test to check the properties of concrete such as Compression Test, V-Funnel test etc. The maximum compressive strength at 28 days is 43 N/mm^2 and tensile strength is 4 N/mm^2. The slump value was 620 mm. The test results indicate that strength is increase up to 10% SCBA replaced with cement.

S.SHANMUGARAJ (2016):-

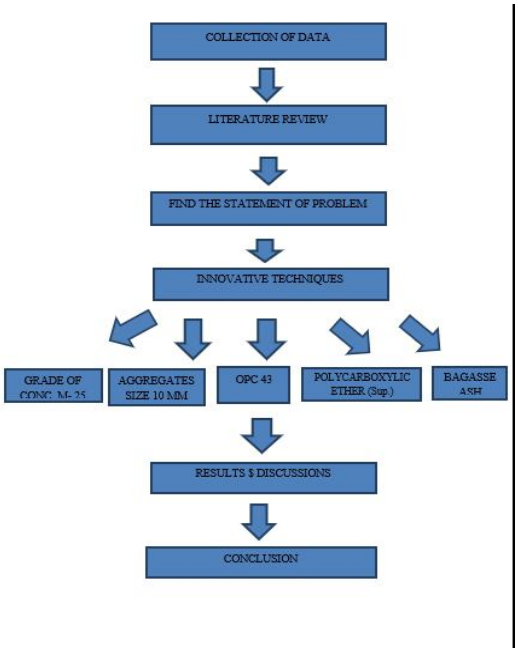
This research determined the fresh and hardened properties of self-compacted concrete by partially replacing cement of 20% by weight. The bagasse ash was obtained 700-800 and sieved through 90 micron meter. Cement Grade 43, Grade of concrete M20, specific gravity of aggregates 2.60, fineness modulus of aggregates 2.59 was used. The mix design of concrete was done according to Indian Code (10262: 2009). Modified carboxylic ether was used as Super-plasticizers. This type of super plasticizers is used where high degree of workability is required. In this research they replaced only 20 % of cement but the dosage of super plasticizers was best in different ratio 0%, 3.5 %, 5 %. It conclude that when there is loss in slump value then improve the workability by adding 2 liters of super plasticizers per100 kg of cementitious material.3.5% dosage of super plasticizers gives better results as compared to other dosage. The maximum compressive Strength at 28 days is 22.82 Mpa. The value of slump at the range 3.5% super plasticizers was 648 mm.

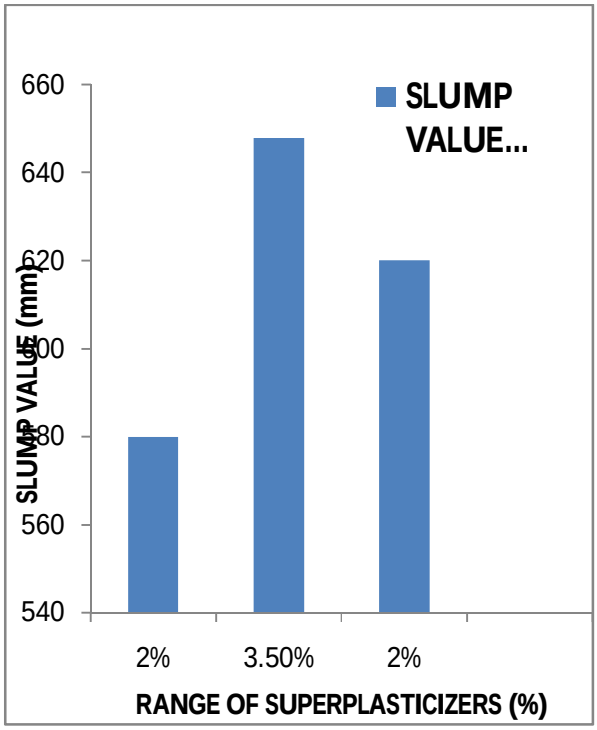
MANOJ KUMAR, MRS REKHA (2017):-

This paper focused on the behavior of M20 grade of concrete by using bagasse ash when OPC 53 grade of cement is partially replaced. Cement is partially replaced in different proportion of 0%, 5%, 10%, and 15%. IS code (12269:1987) was used to make mix design and the mix proportion was (1: 1.75:2.89). The size of fine aggregates used was 2.36 mm and coarse aggregate was 20 mm. To check the workability slump cone test was performed. They concluded that specimen with 15% of sugarcane bagasse ash and 0.5% of super plasticizers gave good results and when they increase the amount of sugarcane bagasse ash the strength will be decreased. It also

shows that load carrying capacity of conventional concrete is less than the bagasse ash.

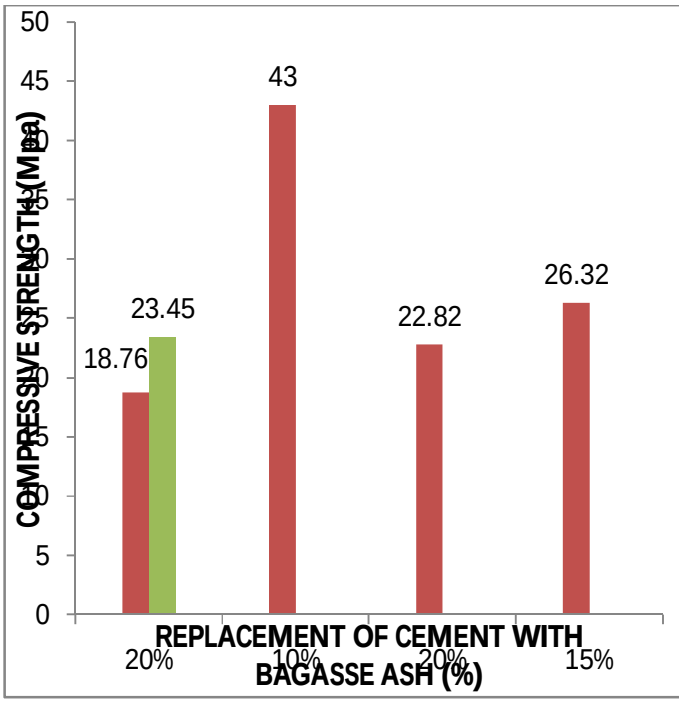
IV. RESEARCH METHODOLOGY





COMPARISON BETWEEN DIFFERENT RANGE OF SUPERPLASTICIZERS AND SLUMP VALUE (ACC TO YEARS)

V. RESULTS AND DISCUSSIONS



GRAPH BETWEEN COMPRESSIVE STRENGTH AND REPLACEMENT OF CEMENT WITH BAGASSE ASH (ACC. TO YEARS)

1) The compressive strength is increased by using bagasse ash but when we increase the amount of bagasse ash then alkali aggregate reaction may be take place due to the presence of higher content of silica and then there is loss in formation of bond.

2) The dosage of super plasticizers should be used in suitable range. Slump value will be increased but it causes loosens the molecules then it delay the setting time of concrete when dosage of super plasticizers is increased.

VI. CONCLUSION

1) Vibrator is not required in self-compacted concrete.
2) Bagasse ash is an ecofriendly material which is used in concrete and helps to reduce the emission of carbon dioxide in atmosphere.
3) The compressive strength is high when bagasse ash is added in concrete as compared with normal concrete.
4) The landfilling method and water pollution problem can be controlled by using waste material.
5) The pozzolanic behavior is maximum in 3-7 day.

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