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# Study of Properties of Concrete with Influence of Over Burnt Bricks as Partial Replacement in Aggregate and It's Performance in Elevated Temperature

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**ABSTRACT:** Concrete is a mixture of cement fine aggregate coarse aggregate and water. Concrete plays a vital role in development of infrastructure viz, building, industrial structures. Bridges and highways etc. leading to utilization of large quantity of concrete. Over burnt bricks are a waste material which cannot be used in construction directly because of their irregular shape and dark colour. Aggregate is also the least expensive per weight unit, put it makes the most amount of the weight. It is costly to transport so local sources are needed, but due to geographical constraint this is not available at all places, therefore it necessitates finding other sources and alternatives from local sources.

## I. INTRODUCTION

Concrete is world's most widely used construction material. It is a homogeneous material with Fine aggregates, coarse aggregates, cement and water with given proportions. The utilization of concrete Is increasing at a higher rate due to development in infrastructure and construction activities all over the world. The properties of plain over burnt brick aggregate are weaker than natural stone aggregate. It has lower specific gravity, high pore rate and thus high-water absorption, lower impact and crushing resistance.

Over burnt bricks are a waste material which cannot be used in construction directly because of their irregular shape and dark colour. Aggregate is also the least expensive per weight unit, put it makes the most amount of the weight. It is costly to transport so local sources are needed, but due to geographical constraint this is not available at all places, therefore it necessitates finding other sources and alternatives from local sources.

In eastern and north eastern states of India and Bangladesh where natural rock deposits are scarce, burnt clay bricks used as an alternative source of coarse aggregate. In these places of Indian brick aggregate are traditionally used as coarse aggregate. Disposal of waste materials can cause environmental problems.

## II. RELATED WORK

**Mr. P.B Autade** the experimental work was carried out on concrete containing over burnt bricks in the range of 0,20,40,60 and 80% replacement by weight of M40 grade concrete the experimental work show some increasing compressive strength, tensile strength, flexural strength and mass density test was replaced by 20% and 40% when compared with conventional concrete, so that over burnt bricks can be safely used in construction for strength purpose.

**Bidve Ganesh Shivakanth** the experimental work carried out using over burnt bricks partially as coarse aggregate in concrete. A 40% of coarse aggregate is replaced by over burnt brick waste in concrete is possible to improve it's compressive, tensile and flexural strength.

**Gopinandan Dey and Joyantapal** the experimental work carried the elevated temperature test using over burnt brick concrete block in the range of 0, 200-, 400-, 600- and 800-degree C and they conclude that there is a gradual increase of strength of concrete up to temperature of 600-degree C.

**Dr. M.N Hiremath** the experimental carried out on concrete containing over burnt bricks in the range of 0, 25, 50, 75 and 100% replacement by weight M43 grade concrete. They conclude that for 25% is found to be better substitute for concrete with respect to strength and considered as the best in view of strength and economy, hence we use it in moderately loaded structures.

**Vikram Kumar Gautham** the experimental carried out on concrete containing over burnt bricks in the range of 25%, 50%, 75% and 100% replacement by weight M20 grade concrete. They conclude that, the best water absorption



was for sample that contained 100% of waste over burnt brick with 19.26%. The crushed bricks will be used satisfactory as coarse combination for creating of acceptable strength characteristics.

### III. METHODOLOGY

In this experimental study M30 grade concrete is designed as per the code, the materials are collected i.e., fine aggregate, coarse aggregates and over burnt bricks with control concrete. Over burnt bricks are partially replaced in coarse aggregate varying 5%, 10%, 15%, 20%, 25%, 25% and 30%. The Moulds are casted for both conventional concrete and replaced concrete and specimens are cured in water for 7,14,28 days respectively.

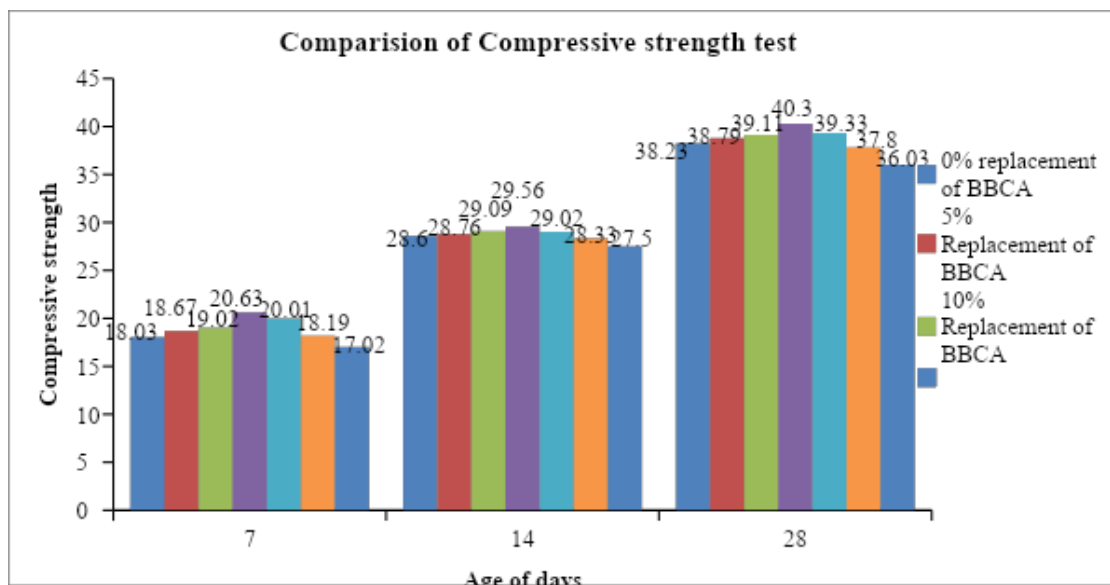
After curing compression strength test, flexural strength test and split tensile strength test is tested for 7,14,28 days and three specimens are tested for each designation and average of three results are taken. The test cubes were placed in an electrically operated temperature of 100°C, 200°C, 300°C and 400°C for a period of 24hr and the cubes were tested for compression strength, flexural and split tensile strength test. Temperature effect on compression and split tensile strength of concrete will be tested.

### IV. EXPERIMENTAL RESULTS

The properties and the quantity of proportions remain same for all the mixes but the percentage of admixtures changes for every mixes. The strengths of self-curing concrete is compared to the strengths of normal concrete.

COMPRESSIVE STRENGTH RESULTS FOR DIFFERENT PERCENTAGE OF BURNT BRICK AS COARSE AGGREGATE FOR M30 GRADE.

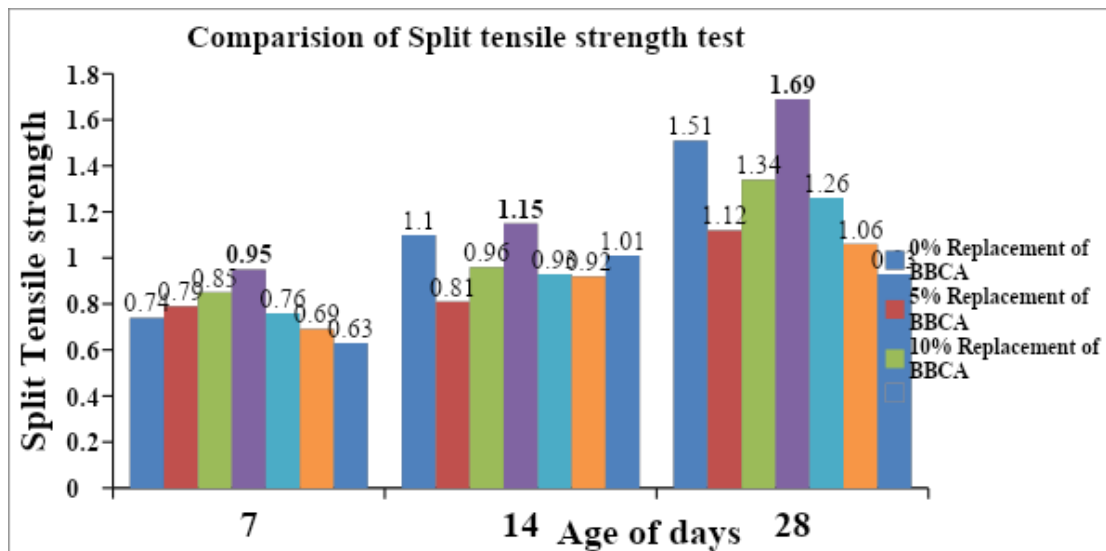
SL.NO	Grade	Percentage Replacement of Burnt brick as coarse aggregate	Age in days	7	14	28
			Compressive strength in MPa			
1	M <sub>30</sub>	0%		18.03	28.60	38.23
2	M <sub>30</sub>	5%		18.67	28.76	38.79
3	M <sub>30</sub>	10%		19.02	29.09	39.11
4	M <sub>30</sub>	15%		20.63	29.56	40.30
5	M <sub>30</sub>	20%		20.01	29.02	39.33
6	M <sub>30</sub>	25%		18.19	28.33	37.80
7	M <sub>30</sub>	30%		17.02	27.50	36.03



The above graph indicates that the compressive strength for 7, 14 and 28 days with 5%, 10%, 15%, 20%, 25% and 30% of over burnt bricks. The optimum value is obtained at 15% replacement of OBB in compressive strength test.

SPLIT TENSILE STENGTH RESULTS FOR DIFFERENT PERCENTAGE OF BURNT BRICK AS COARSE AGGREGATE FOR M30 GRADE.

SL.NO	Grade	Percentage Replacement of Burnt brick as coarse aggregate	Age in days	7	14	28
			Split Tensile Strength in Mpa			
1	M <sub>30</sub>	0%		0.74	1.10	1.51
2	M <sub>30</sub>	5%		0.79	0.81	1.12
3	M <sub>30</sub>	10%		0.85	0.96	1.34
4.	M <sub>30</sub>	15%		0.95	1.15	1.69
5	M <sub>30</sub>	20%		0.76	0.93	1.26
6	M <sub>30</sub>	25%		0.69	0.92	1.06
7	M <sub>30</sub>	30%		0.63	1.01	0.93

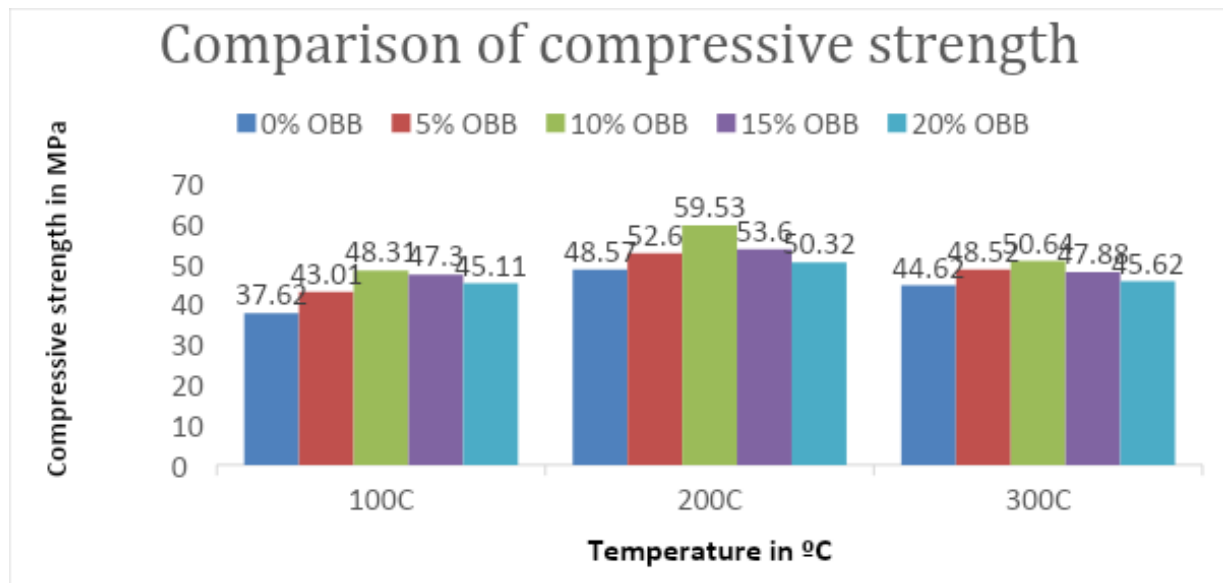


The above graph indicates that the split tensile strength test for 7, 14 and 28 days with 5%, 10%, 15%, 20%, 25% and 30% of over burnt bricks. The optimum value is obtained at 15% replacement of OBB in split tensile strength test.

#### COMPRESSION STRENGTH RESULTS FOR DIFFERENT PERCENTAGE OF BURNT BRICK AS COARSE AGGREGATE FOR M30 GRADE.

SL.NO	Grade	Percentage Replacement of Burnt brick as coarse aggregate	Temperature	100°C	200°C	300°C
			Compression strength in MPa			
1	M <sub>30</sub>	0%		37.62	48.57	44.62
2	M <sub>30</sub>	5%		43.01	52.60	48.52
3	M <sub>30</sub>	10%		48.31	59.53	50.64
4.	M <sub>30</sub>	15%		47.30	53.6	47.88
5	M <sub>30</sub>	20%		45.11	50.32	45.62





## V. CONCLUSION

1) The Compressive strength, split tensile of M30 grade mix is expected to increase with increase in percentage of over burnt bricks as compared to conventional/nominal concrete. It is noticed that the maximum results is obtained for 15% replacement.

2) The Compressive strength of concrete M30 grade mix is increase with increase in percentage of over burnt bricks as compared to conventional/normal concrete. The optimum value is obtained at 200°C temperature for 10% replacement.

3) The partial replacement of OBB with varying percentage as 0%, 5%, 10%,15%,20%,25% and 30%, the strength results will increase up to 15% replacement of OBB and further varying the strength starts to decrease when compared with the conventional concrete.

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