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An Escalation Over Mechanical Attributes in M30 Type Solid Using Qualified Fill-In by Brick Dust to Cement & Saw Dust to Sand

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Abstract **-** In this era of civilization, the major industry needful to every household is construction sector which occupies 3rd place among 13 economic sectors in the world. The serious drawback of this sector – one is pollution & second is Scarcity of materials. In the present scenario, the world is stepping towards the new thoughts in pattern to shuffle the contamination by using the proxy materials instead of cement sand & aggregates due to its famine.

In this paper of examine talks about the progression of mechanical attributes in concrete. The proxy materials used of mainly two, such that Brick Dust (BD) which is Squander left over the manufacturing of bricks & Saw Dust (SD) is thrift obtained after the wood working operations composed of small chips of wood. The qualified fill in concentrates over the cement with Brick dust with increased measures of frequency like 3%, 6%, 9%, 12%, & 15%, simultaneously on the other side over Fine aggregate with Saw Dust with constant proportion of 5 % respectively for M30 type Solid. Moreover the comparison is held between the conventional Solid & Solid with proxy blends like 0%BD+0%SD, 3%BD+5%SD, 6%BD+5%SD, 9%BD+5%SD, 12%BD+5%SD & 15%BD+5%SD

Key Words**:** Cement, Mechanical Attributes, Brick dust (BD), Saw Dust (SD), & M30 Solid

1. INTRODUCTION

1.1 Presentation over Qualified Fill-in Materials in Solid

We all know that the cause of using the replacement materials in today's world is because of two well known things regarding as follows:

1. Emission of more amount of CO from solid – effects indirectly pollution & depletes the ozone layer.
2. Scarcity of materials like Sand & aggregates & Cement.

Now it's time to eradicate the causes which are releasing from the solids as well as reducing the scarcity by using the qualified fill-ins over the solids. In recent times the technology is extending its graph in replacement of new materials which interns increase in the mechanical attributes in concrete. By the reference of above context I would like build a new concrete by substituting two new fill-ins like Brick Dust (BD) & Saw Dust (SD).Here we examine the paper by replacing Brick Dust in Cement in a percentage from 3% to 15% with frequency of 3% increase. The BD is a byproduct which is obtained from the Manufacturing process of bricks as a left over waste and simultaneously we replace one more fill-in with Fine aggregate by Saw Dust in fixed proportion like 5% as Constant. The SD is waste product obtained from the mechanical operations like produced during the cutting, sawing, edging, trimming, and smoothing of wood over wood processing industry. One of the Major concentrations is to improve the Compressive Strength, Tensile Strength & Bending Strength of this new concrete by using the above proportion as like.

1.2 Flow Diagram of Saw Dust Obtained from wood

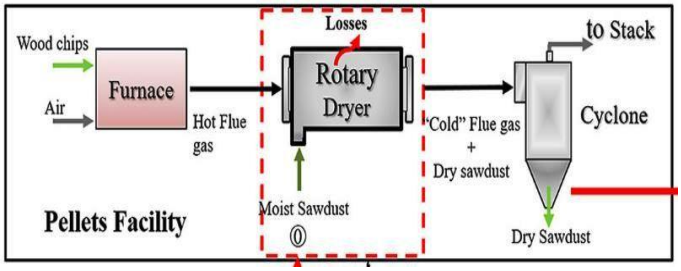


Fig-1: Flow Chat describing manufacturing of Saw Dust from Wood

The above flow chart explains the detailing how the wood chips are getting coverted to Saw Dust. The above process is involved with two steps as follows:

1. Crushing
2. Drying

The collection Raw Materials From the Wood Processing industry like Wood chips or Pellets are firstly sent into a Furnace along with air where heating operations are done over it with a temperature in between 180ºC -240ºC then there is release of hot flue gas from it. After this the left is progressed into the Rotary Drier where the losses as well as Moisture are removed from the Saw dust. Finally the dust is sent into Crusher which is in the shape of cyclone along with cold flue gas where we get our final byproduct from it called SAW DUST**.**

1.3 Flow Diagram of Brick Dust Obtained from Waste Bricks

Fig-2: Flow Chat describing manufacturing of Brick Dust from Waste Bricks.

The Manufacturing Process of Brick Dust is employed

in the following steps with operations done mechanically gone through:

1. Jaw Crusher
2. Ball Grinding Mill
3. Planetary Ball Mill

The overall Process includes like firstly the collection of Waste bricks obtained while from the demolition of buildings .The Waste Bricks dumped into the Jaw Crusher resulting us a recycled bricks in the form of aggregates resembling with a size of 10 mm. The Second Step involved progressing the recycled bricks into the Grinding mill which concludes us a recycled brick powder with a maximum size of 150 microns. The Final step is done by using a planetary ball mill crushes like a powder form where ends the brick dust with a size of 45 microns.

1.4 Methodology

The Methodology describes the fill-ins used & mechanical attributes done over this paper:

1. Understudy of Brick Dust to Cement & Saw Dust to Sand with percentage of 3%-15% in cement & a fixed proportion of 5% in Sand respectively.
2. Property check of Compressive Strength for cubes with a size of 150mm*150mm*150mm.
3. Property check of Tensile Strength for cylinder with dimensions of 150mm diameter & 300mm Height.
4. Property check of Bending Strength for Beam with a dimensions of 500mm*100mm*100mm.

2. MATERIALS USED

Brick Dust (BD):

Clean from deteriorating bricks; particularly, the tidy of beat Shower brick (which see, beneath brick, n.), or the ground from which Shower brick is made. In any case, quality discoveries were exceedingly comparable; substituting cement with 15% brick clean shows more prominent compressive quality. The part pliable test were too done, which illustrates tall malleable quality by substituting cement with 15% brick tidy. This inquire about uncovers that cement may be substituted with brick tidy.

Fig-3 Brick Dust (BD)

Saw Dust (SD):

Sawdust (or wood tidy) may be a by-product or squander item of carpentry exercises such as sawing, sanding, processing and steering. It is developed of greatly diminutive pieces of wood. Too, it moves forward upgraded toughness; Sawdust is exceptionally strong and safe to rot, giving them a long-lasting elective to standard building materials. By utilizing sawdust in building, the carbon impression of the development prepare may too be minimized.

Fig-4 Saw Dust (SD):

Table No: 1. Physical properties of Brick Dust (BD):

S.No	Physical Property	Brick Dust
1	Appearance	Uniform & Bright
2	Size of Particle	Material Passed through IS Sieve 90 micron
3	Color	Class Red
4	Density	1600-1800 Kg/m^3
5	Water absorption	0.36 %
6	Specific Gravity	2.69

Table No: 2. Chemical properties of (BD) & (OPC):

S.No	Chemical Composition	OPC (%)	BD (%)
1	CaO	40.83	0.62
2	Sio2	38.13	41.89
3	Al2O3	8.76	38.95
4	MgO	1.55	-
5	SO3	2.25	1.46
6	Fe2O3	2.67	12.13
7	Misc	5.81	4.95

Table No: 3. Physical properties of Saw Dust (SD):

S.No	Physical Property	Saw Dust
1	Appearance	Fiber
2	Size of Particle	Material Passed through IS Sieve 4.75mm
3	Color	Whitish brown
4	Density	205 Kg/m^3
5	Water absorption	10.8%
6	Specific Gravity	0.95

Table No: 4.Chemical properties of (SD) & (FA):

S.No	Chemical Composition	FA (%)	SD (%)
1	CaO	-	2.51
2	Sio2	96.35	89.01
3	Al2O3	2.59	2.72
4	MgO	-	0.21
5	SO3	-	-
6	Fe2O3	0.06	1.45
7	Loss on ignition	1.00	4.1

3. LITERATURE REVIEW

Numerous thinks about have been conducted on concrete in which the brick clean has been in part supplanted by cement, as well as another with Fine total with Saw Clean, and quality tests such as execution tests, compressive quality tests, mellabale quality, and twisting quality estimations have been made independently at diverse levels of concrete tests. The degree of relocation improves the quality of the concrete up to the rate of

relocation. Moreover, there are a few disparities within the discoveries of distinctive tests due to fluctuations in materials and gear. The taking after papers was explored:

Mohd Ishaq Hassan , Sandeep Nasier International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN: 2278-3075 (Online), Volume-9, Issue-7, May 2020 Replacing mortar sand with sawdust and brick chips is feasible since it enhances the strength and wear resistance of . When the sand replacement is 10%, the rise in compressive strength of is ideal, and when 20% of is substituted, the compressive strength is greater than that of ordinary mortar. After 20% replacement, the compressive strength of decreases. Wind resistance is stronger in partial mixes than in standard mortar. The ideal proportion of is 20% where it demonstrates improved resistance to abrasion. 10% exchange displays higher resistance than 30% exchange.

Muhammad Nasir Ayaz Khan, Nabeel Liaqat , et.al., IOP Conf. Series: Materials Science and Engineering 414 (2018) 012005414, 012005. The greatest droop was found at 15% substitution after that it carries on decreasing. The least esteem of droop was recorded at 20% replacement. Compressive quality tends to extend by expanding brick clean rate up to 15%. Past this substitution the compressive quality shows more regrettable execution at 20% substitution. Part malleable quality rises by expanding brick clean substance up to 15%, over this substitution the part ductile quality starts to deteriorate. Brick clean may be used as plasticizer because it minimizes water necessity since workability is rising.

4. MIX DESIGN

Final trial mix for M30 grade concrete is 1:1.58:2.43 at w/c of 0.44

Table no 5: Mix proportion of M30

Grade	**M30**
Proportion	**1:1.58:2.43**
W/C ratio	**0.44**
Cement	**448.18**
Fine Aggregate	**708.84**
Coarse Aggregate	**1090.19**
Water	**197.2**

5. TEST SETUP

Fig-5 Test Setup of Moulds

Metal form, press or cast press, if possible thick enough to prevent misshaping. They are designed to allow for the safe evacuation of the moulded construction and, when ready for use, are machined to the proper dimensions and needed inner space within the following confinements. The separation between the kick the bucket and the rear surface is equal to the measured length plus 0.2 mm. The distance between the edge and centre of the inner section of the form and the beat and foot of the shape should be 900 ± 0.50. The form dimensions are given below:
Cube is 150mmx150mmx150mm.
Cylinder: distance across 150mm × height 300mm.
Beam Dimensions: 500mmx100mmx100mm.

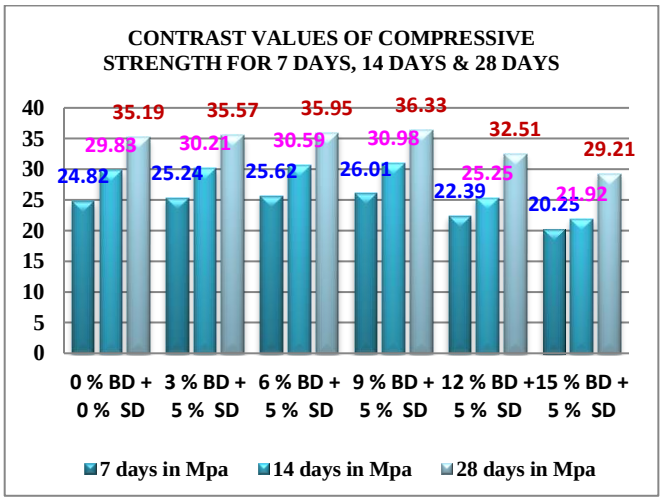
Fig-6 Compressive Strength of Cubes & Split Tensile Strength of Cylinders

6. TEST RESULTS

Table no : 6. Test results of Compressive Strength at 7 days, 14 days & 28 days:

Mix % Replacement	**7 days in Mpa**	**14 days in Mpa**	**28 days in Mpa**
0 % BD + 0 % SD	24.82	29.83	35.19
3 % BD + 5 % SD	25.24	30.21	35.57

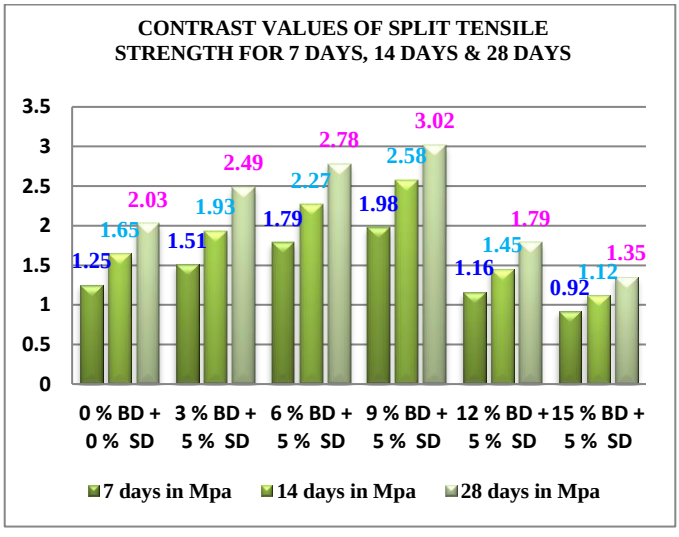
6 % BD + 5 % SD	25.62	30.59	35.95
9 % BD + 5 % SD	26.01	30.98	36.33
12 % BD + 5 % SD	22.39	25.25	32.51
15 % BD + 5 % SD	20.25	21.92	29.21



Graph no: 1. Contrast Values of Compressive Strength at 7 days, 14 days & 28 days:

Table no : 7. Test results of Split Tensile Strength at 7 days, 14 days & 28 days:

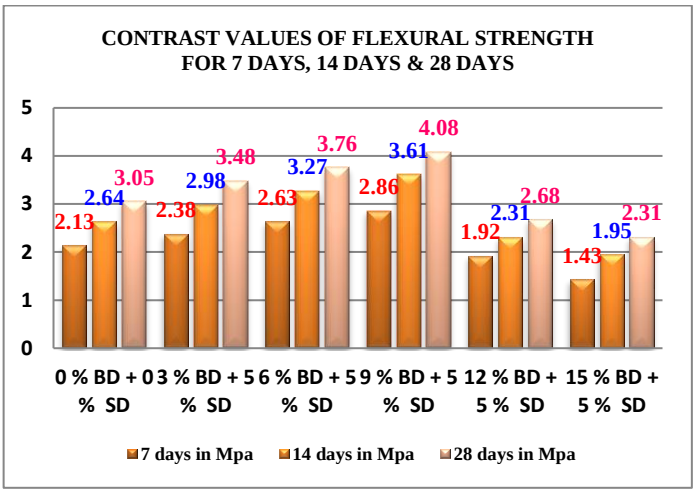
Mix % Replacement	7 days in Mpa	14 days in Mpa	28 days in Mpa
0 % BD + 0 % SD	1.25	1.65	2.03
3 % BD + 5 % SD	1.51	1.93	2.49
6 % BD + 5 % SD	1.79	2.27	2.78
9 % BD + 5 % SD	1.98	2.58	3.02
12 % BD + 5 % SD	1.16	1.45	1.79
15 % BD + 5 % SD	0.92	1.12	1.35



Graph no: 2 Contrast values of Split Tensile strength for 7 days, 14 days & 28 days

Table no: 8. Test results of Flexural Strength at 7 days, 14 days & 28 days:

Mix % Replacement	7 days in Mpa	14 days in Mpa	28 days in Mpa
0 % BD + 0 % SD	2.13	2.64	3.05
3 % BD + 5 % SD	2.38	2.98	3.48
6 % BD + 5 % SD	2.63	3.27	3.76
9 % BD + 5 % SD	2.86	3.61	4.08
12 % BD + 5 % SD	1.92	2.31	2.68
15 % BD + 5 % SD	1.43	1.95	2.31



Graph no: 3 Contrast values of Flexural strength for 7 days, 14 days & 28 days

7. CONCLUSIONS

Depending on the preceding thoughts and advances, this essay may be finished by focusing on the following points:

- The data for compressive strength clearly demonstrate that the substitution of brick Dust to Cement & Saw Dust to Sand is done in the range from 0%BD+0%SD to 15%BD+5%SD achieved a Characteristic Compressive Strength of 36.33 Mpa at 28 days for the replacement of 9%BD+5%SD.
- The results for the malleable quality and flexural quality clearly show that when brick Dust to Cement & Saw Dust to Sand is done in the range from 0%BD+0%SD to 15%BD+5%SD achieved a Tensile Strength of 3.02 MPa & Flexural Strength of 4.08 MPa at 28 days for the replacement of 9%BD+5%SD respectively
- For 28 days of compressive quality, the rate escalation inside the concrete is 3.23 % as compared to conventional concrete
- The test data suggest that replacing cement with brick dust gives increased workability up to 9%.
- The employment of Saw Dust to Sand with 5% constant shows us superior insulation & lowered weight, good Resiliency, & fewer tendencies to shatter in a brittle fashion all these lead to clear environmental advantages.
- Based on our involvement, we'll refer to it as green concrete. • Additionally considerably fewer amounts of brick dust and Saw dust is fetched, allowing for a drop in the fetched concrete.

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