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EXPERIMENTAL INVESTIGATION ON BEHAVIOUR OF BEAM USING LATHE WASTE

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ABSTRACT

An experimental investigation is carried out on the strength of lathe waste concrete and behaviour of lathe waste in concrete beams. The lathe waste which is occurred in the powdered form as a raw material which is used in the concrete cubes, cylinders and beams. The Concrete mixes are tested for its compressive strength, split tensile strength and Flexural Strength. The beams were tested for the deflection and cracking. Due to the addition of lathe waste, the powdered form of steel waste when added along with the concrete which tends to attain more strength of the concrete, when compared with the normal conventional concrete. The addition of lathe waste takes place by the percentage of the lathe waste 0%,1%,1.5%,2%,2.5% and tested for its strength and deflection.

Keywords: *Industrial waste, Steel Scrap, Flexural behaviour, Tensile strength*

I. INTRODUCTION

Concrete is most frequently used man-made material in the world. It is durable, inexpensive and readily mouldable into complicated shapes and had good compressive shapes and has good compressive strength and stiffness. It has low tensile, low ductility and low energy absorption. The available steel waste which we are using in this project is a waste material which is collected from the lathe, in a powdered form, as a raw material added to the concrete, when the lathe waste added along with the concrete will attains more strength when the steel gets mixed with the concrete.

II. Literature: Concrete is one of the most important bonding materials in the building where the concrete is weak in tension and strong in compression. To improve the concrete properties, we are using the steel fibers in to the concrete as stated by Irwan (2013) in his work. Also, Kishor (2012) stated that by using the steel fibers in the concrete which gives more strength and increases the high compressive strength. Prakash et al., (2006) have stated in their work that these steel fibers has the advantage of high compressive strength and good fire resistance, high water resistance, low maintenance and long service life. The disadvantage includes the low strength per unit weight (Irwan (2013), Kishor and Madhuri (2012), Ribelloato and Mohamdelhassan (2014), Shiirule et al (2012), Sezhiyan and Rajkumar (2014)). Fibers are used to control cracking. These lathe waste do no increase the flexural strength but help to carry load by increasing the tensile strength of the material was studied by Vijayakumar et al., (2012)

III.Materials and Properties

Basic test where conducted on cement, fine aggregate, coarse aggregate to check their sustainability of concrete.

1.Cement

Ordinary Portland cement 53 grade conforming to indian standard.

Table 1. Properties of Cement

Properties	Value
Specific gravity of cement	3.15
Fineness of cement	6%
Initial setting time of cement	28 minutes
Final setting of cement	585 minutes

2.Fine Aggregate

From the sieve analysis the particle size distribution in a sample of aggregate is obtained known as fineness of modulus of aggregate.

Table 2. Properties of Fine Aggregate

Properties	Value
Specific gravity	2.2621
Water Absorption	4.6%
Bulk density	1.56 g/cc

3.Coarse Aggregate

Table 3 Properties of Coarse Aggregate:

Specific gravity of coarse aggregate	2.745
Water absorption of coarse aggregate	0.53%

4.Water

Water is the important ingredient of concrete as it actively participates in the chemical reaction with cement.

5.Lathe Waste Steel Scraps

Lathe waste which are collected from the industries are collected in the powdered in the form as a raw material. These lathe waste is used

in the concrete as a powdered form as the binding material.

Table 3: Properties of Lathe waste

s.no	Physical properties	Chemical properties
1.	Ductility,malleability and thermal conduct-ivity	Boiling point of iron fiber is 2862 degree
2.	Beaten into sheets, without cleavage and ductility makes possi-ble for thin wires to be drawn from it.	Iron is the transis-tiona metal,it has strong attractive forces between the atoms and they are only weake-ned to very high.

III.Experimental Methodology

1.Compressive Strength: In the experimental investigation the conventional concrete cubes were casted of size 150mm x 150 mm and the mix with the ratio of 1:2:2,for the M 30 grade of concrete, along with the lathe waste is added to the percentage of 0%,1%,1.5%,2%,2.5% and the mixes were named as mM,M1,M2,M3,M4 respectively

Table 5: Compressive Strength of Concrete for 28 Days

No:of days	M (N/ mm^2)	M1 (N/ mm^2)	M2 (N/ mm^2)	M3 (N/ mm^2)	M4 (N/ mm^2)
28	13.6	23.2	15.11	26.26	27.33
28	11.11	20.6	27.33	23.95	21.6
28	22.57	18.8	2.4	29.37	21.86

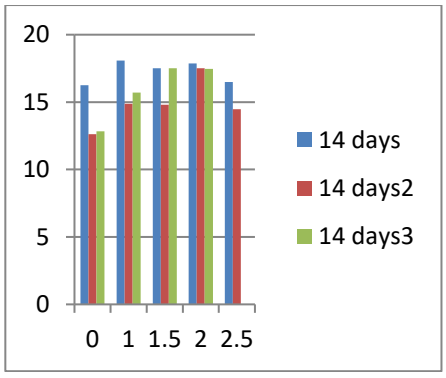

Figure 1: Compressive Strength of Cube 14 Days

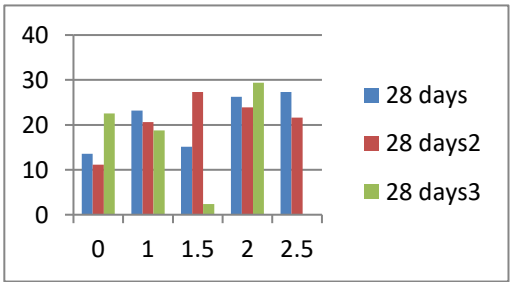

Figure 2: Compressive Strength of Cube 28 days

The above graph which indicates the mix 3 of 2% lathe waste added to the concrete is the one which gives more strength to the mix ratio of the grade M30 of the concrete of 1:2:2 The above graph which indicates the more strength in the lathe waste added to the concrete of the mix 3 ,2% lathe waste added to the concrete, of the grade M30, 1:2:2.

2.Split Tensile Strength:

Table 6: Split Tensile Strength of Concrete For 7 Days

No:of days	M	M1	M2	M 3	M 4
7 days	14.46	15.46	16.97	15	12.27

Table 7: Split Tensile Strength of Concrete For 28 Days

No:of days	M	M1	M2	M 3	M 4
28 days	7.1	8.185	22.43	15.91	21.37

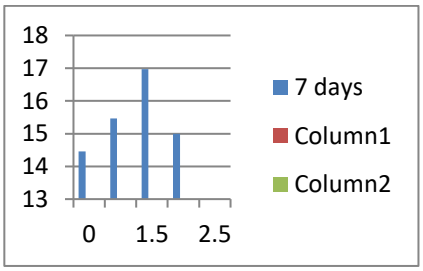

Figure 3. Split Tensile strength of specimen in 7 days

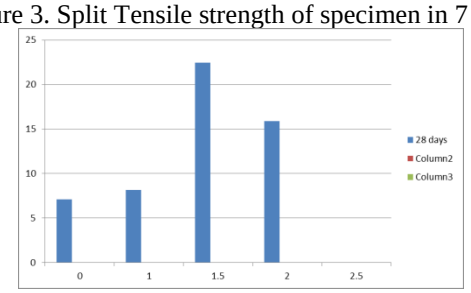

Figure 4. Split Tensile strength of specimen in 28 days

The above graph shows the maximum strength in the mix 3, of adding 2%lathe waste added with the concrete**.** The above graph indicates the maximum strength increased in the mix 3, where 2% of lathe waste is added, to the M 30 Grade of the concrete of the ratio 1:2:2.

Figure 5: Test Setup

Figure 4: Failure of Specimen

3.Flexural Strength Test

a) **BEAM 1:** 0% of lathe waste is added to the beam, ratio of 1:2:2 of M 30 grade of the concrete

Table 8: Deflection of Beam 1

L1	centre	L2
95	90	70
180	190	140
210	320	260
310	430	350
400	535	440
540	620	560
660	740	680
710	850	760

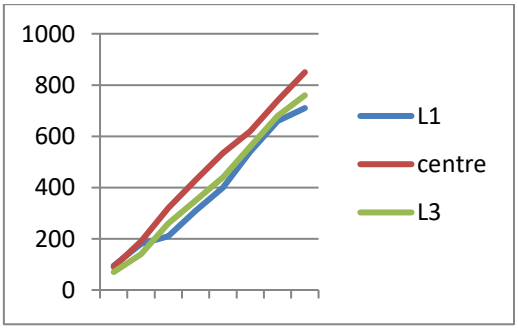

Figure 5: Deflection of Beam 1

Figure 6: Failure of Beam 1

Deflection of the beam which is casted for the ratio 1:2:2 of M 30 grade of concrete without adding the lathe waste

b) BEAM 2: The beam 2 is casted for the ratio 1:2:2 of the M 30 grade of the concrete by adding along with the lathe waste of 2%.

Table 9: Deflection of Beam 2

Centre	L2
50	50
125	100
220	170
320	250
410	320
525	390
585	470
645	570
705	640

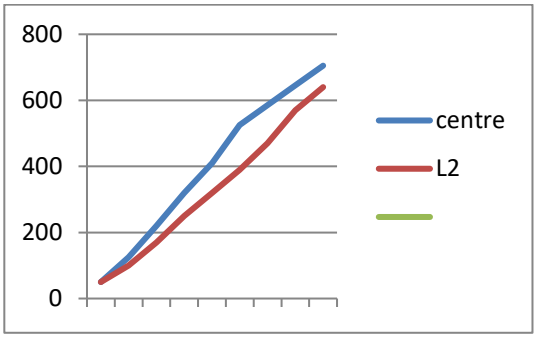

Figure 7: Deflection of Beam

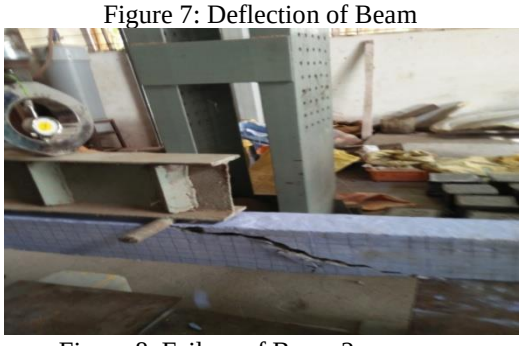

Figure 8. Failure of Beam 2

The above graph which indicates the deflection of the flexural load applied to the beam of the lathe waste added to the concrete of 2% of lathe waste of the M30 grade ,1:2:2. Beam 2 which is casted

for the mix ratio of 1:2:2 of the M30 grade of the concrete along with adding the
lathe waste of 2% has been get deflected when the load is applied on it.

V. RESULTS AND DISCUSSION

The concrete cubes, cylinders and two beams are casted for the design mix ratio of M30 grade of concrete of ratio 1:2:2.

(i)By adding the lathe waste to the design mix ratio of percentage of 0%,1%,1.5%,2%,2.5% of lathe waste along with the concrete, for the compressive strength of concrete

(ii) From the above experiments we conclude that the lathe waste added to the concrete to the ratio of 2% along with the concrete mix design ratio 1: 2: 2, which gives more strength.

VI. Conclusion

Thus, it is concluded that the lathe waste can be used as a replacement to increase the strength of the concrete. As the surface area of the Lathe scrap waste tend to decrease the workability addition of VMW and Super plastiziers can be recommended. Future studies on the corrosion of scraps can be monitored through proper methods

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