

# Studies on Properties of Concrete Replacing Lathe Scrap

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**Abstract :** Industrial waste creates hazardous and landfilling, they pollutes the environment nowadays. So it must be concernable thing to avoid such hazardous creating materials. For that reason, use the industrial wastes as replacing material in construction field. The huge amount of wastes produces from Iron and Steel industries. It creates a landfilling and hazardous to environment. The Lathe scrap is the waste collected from iron and steel industries. This paper is about reuse the industrial wastes in concrete. The purpose of use the waste materials to reduce the environmental hazards. In addition to this, to find the properties of concrete while using replacement material Lathe scrap. In India approximately 600 million tonnes of recyclables every year. This is more reliable and low cost.

**Keywords –** Hazardous, Lathe scrap, Land filling, Properties, Reuse.

## I. INTRODUCTION

Generally, concrete consist of cement, coarse aggregate and fine aggregate. Their proportion in the concrete is based on grade of concrete and it determines the strength also. Nowadays use of resources in the construction industry is very high. This project is to replace the material in concrete for better improvement of concrete properties and also determine the characteristic strength of replacing material. The main aim for this project is to avoid soil infertility, land filling and environmental hazards creates by industrial waste of iron and steel industries. In this modern world when the unbelievable demand of steel is on its peak. So their wastes also obtain in huge amount. According to ICI, around 1200 million tonnes of lathe scrap obtaining annually. India is the world's 3<sup>rd</sup> largest producer of crude steel. Hence the materials can be easily available from Iron and Steel industries. While using the wastes in concrete it saves the energy and time. In addition to that, it is more reliable and low cost.

## II. RAW MATERIALS

### 1. Cement

In the present study of project, the Ordinary Portland Cement (OPC) can be used throughout the investigation. Using the OPC was confining to IS Code 8112-1989. The Initial and Final setting time of cement are 180 minutes and 240 minutes respectively. According to ASTM C188, the specific gravity of cement is about 3.15. In other words, the OPC is about 3.15 times heavier than water. According to the IS Code 4031-part4-1988, the consistency of OPC is about 33%. The grade of OPC used in this concrete was 53 grade.



OPC Cement

### 2. Fine Aggregate

The size of fine aggregate should not less than 150 microns and not more than 4.75mm. The pycnometer test was conducted to find the specific gravity. The specific gravity of fine aggregate is 2.67.

### 3. Coarse Aggregate

The size of coarse aggregate carried out for the test is 12.5mm. The coarse aggregate can be obtained from locally available source. The specific gravity of coarse aggregate is 2.76.

### 4. Lathe Scrap

From the past many researchers during their research work have come across many benefits and barriers. The replaced concrete aggregate proved to be a good substitute for aggregate in the concrete production. The lathe scrap is act as a good fiber in the concrete. To estimate the strength,

durability, workability and other characteristics of concrete. The raw materials obtained from Iron and Steel industries. It also produced from lathe industries also. The aggregate which comprises of 70 % to 80% volume of concrete has three main functions are to provide a cheap filler, to provide a mass of particles for resisting the action of applied loads and to reduce the volume changes resulting from the settling and hardening process. The density of lathe scrap is 7850 kg/m<sup>3</sup>.



Lathe scrap

5. Water

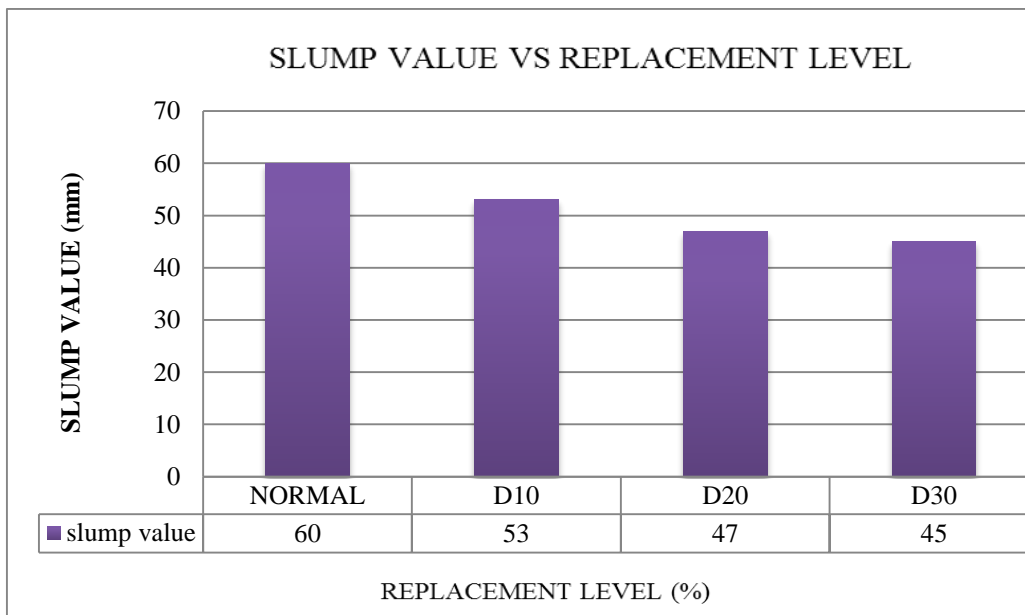
The water used for the experimental study should not more than the p<sup>H</sup> level of 6. The water can be used for the experiment from nearby source.

III. MIX DESIGN AND MIXING OF CONCRETE

Lathe scrap in the order of 10%, 20% and 30% is used in concrete with the mix ratio of M20. As per Indian standard (IS) Guidelines the mix design was carried out. The mix proportions of the concrete were 1:2.4:4.92:0.5 (Cement, Fine aggregate, Coarse aggregate and water/cement ratio).The mixing can be done by manual.

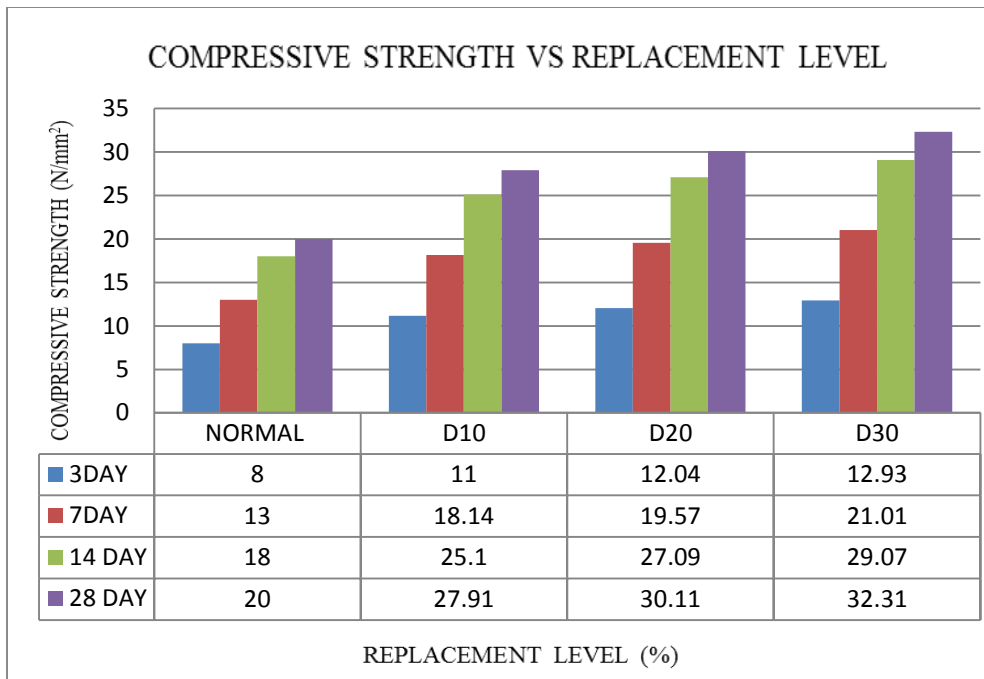
IV. SLUMP CONE TEST

GRADE	SPECIMEN	SLUMP VALUE(mm)
M20	NORMAL	60
	D10	53
	D20	47
	D30	45



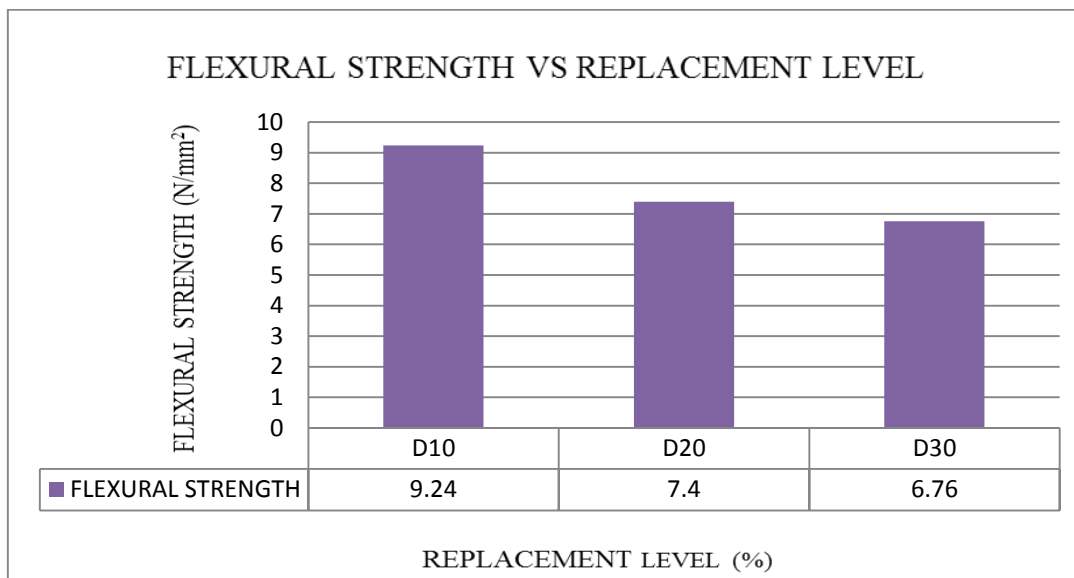
V. COMPRESSIVE STRENGTH TEST

GRADE	SPECIMEN	COMPRESSIVE STRENGTH (N/mm <sup>2</sup> )			
		3 DAY	7 DAY	14 DAY	28 DAY
M20	NORMAL	8	13	18	20
	D10	11.16	18.14	25.12	27.91
	D20	12.04	19.57	27.09	30.11
	D30	12.92	21.01	29.08	32.31



#### VI. FLEXURAL STRENGTH TEST

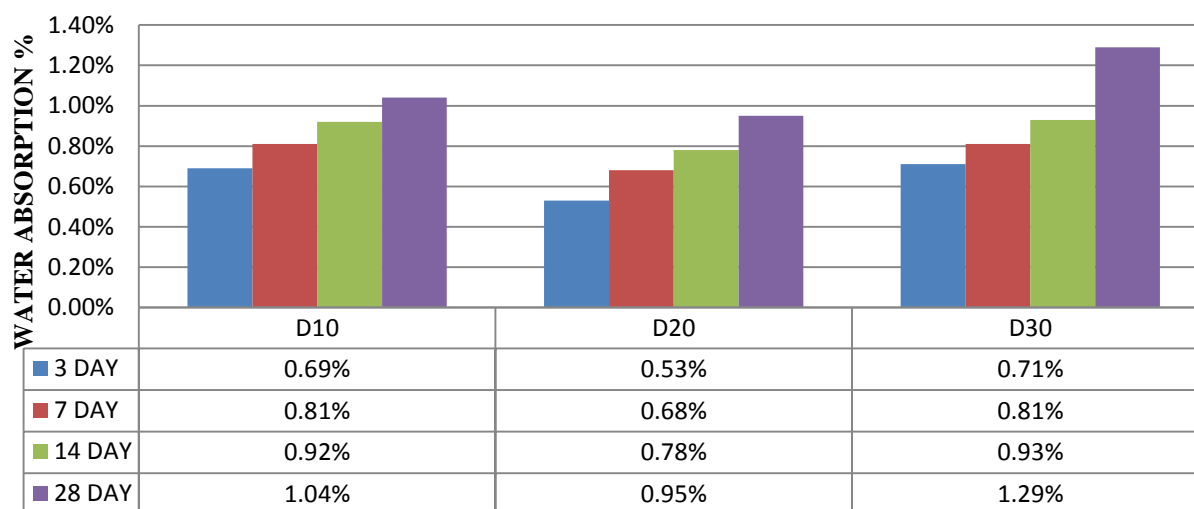
GRADE	SPECIMEN	ULTIMATE LOAD (KN)	FLEXURAL STRENGTH (N/mm <sup>2</sup> )
M20	D10	23.1	9.24
	D20	18.5	7.40
	D30	16.9	6.76



VII. WATER ABSORPTION TEST

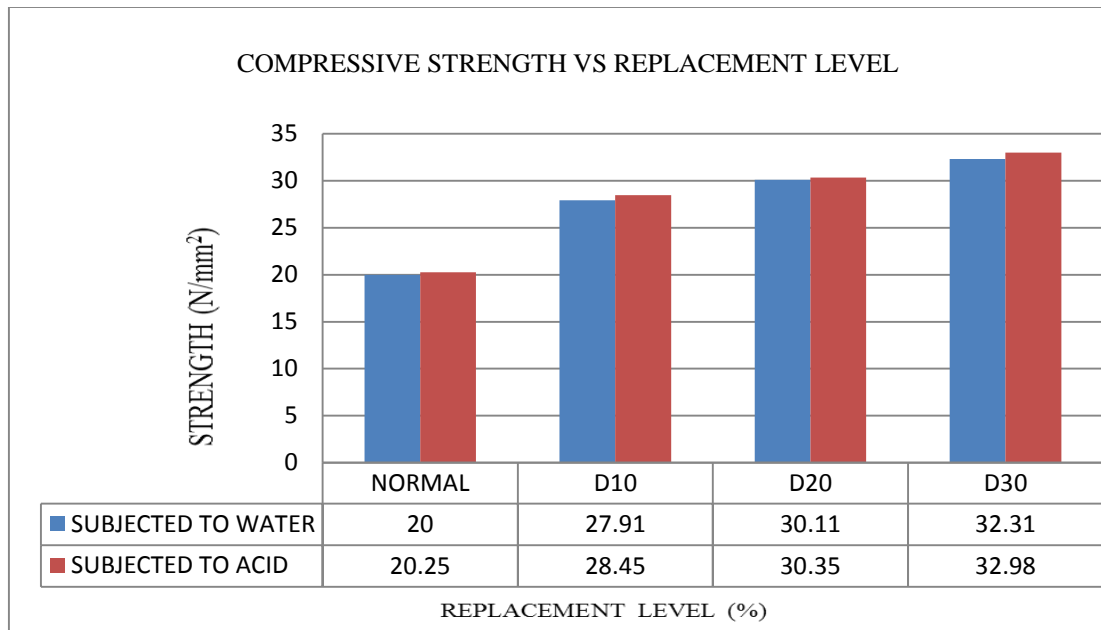
GRADE	DAYS	SPECIMEN	DRY WEIGHT (A) Kg	WET WEIGHT (B) Kg	WATER ABSORPTION (%)
M20	3 DAY	1D10	8.65	8.71	0.69
	7 DAY	2D10	8.62	8.69	0.81
	14 DAY	3D10	8.68	8.76	0.92
	28 DAY	4D10	8.63	8.72	1.04
	3 DAY	1D20	8.585	8.631	0.53
	7 DAY	2D20	8.552	8.61	0.68
	14 DAY	3D20	8.553	8.62	0.78
	28 DAY	4D20	8.59	8.672	0.95
	3 DAY	1D30	8.56	8.621	0.71
	7 DAY	2D30	8.61	8.68	0.81
	14 DAY	3D30	8.59	8.67	0.93
	28 DAY	4D30	8.50	8.61	1.29

WATER ABSORPTION % VS REPLACEMENT LEVEL



VIII. ACID RESISTANCE TEST

GRADE	SPECIMEN	STRENGTH BEFORE SUBJECTED TO ACID CURING N/mm <sup>2</sup>	STRENGTH AFTER SUBJECTED TO ACID CURING N/mm <sup>2</sup>
M20	NORMAL	20	20.25
	D10	27.91	28.45
	D20	30.11	30.35
	D30	32.31	32.98



**IX. RESULT AND DISCUSSION**

The result which are obtained from the different tests to be carried out for determining the properties of concrete.

*a) Workability*

The workability of concrete can be checked by conducting of slump cone test. From the obtained results, the workability of concrete will be increases as increase upto 30%.

*b) Compressive strength test*

The compression strength was determined by using M20 mix of 1:2.4:4.92:0.5 (cement, fine aggregate, coarse aggregate and w/c) .The lathe scrap used in the concrete on various percentage (10%, 20% and 30%). From the experimental result, the compressive strength can be increased upto 30%. The strength get reduced beyond 30%.

*c) Flexural strength test*

The flexural strength is a mechanical property of material which can be done by standard set of UTM. The test can be done in the machine under the capacity of 1000KN. The strength get reduced beyond the range of 20%.

*d) Water absorption test*

The specimens where demoulded after the period of 24hrs from the casting. The specimens were cured in water for 28 days or till the date of testing. The test can be done for the purpose of determining the water absorbing capacity of the concrete.

*e) Acid resistance test*

The acid resistance test is conducted to examine the concrete, whether it resist with acids or not. In the acid resistance test the acids like sulphur and Hcl are used. The presence of acid on concrete spoil its characteristic strength . the specimen immersed in acid for 2-3 days. After 2 or 3 days of immersion the specimen can be test. From the obtained result the strength get increased.

**X. CONCLUSION**

In this proposed project, the Lathe scrap is replaced in the concrete to found the strength and other specific properties. The information gathered from the project explains and concluded that the Strength and other Specific properties of concrete can be improved. It yields high performance and high strength concrete. It also described that concrete having good resistance power against chemical action and corrosion. The advantages about each materials are listed below:

- Using of these steel recycling was 74% less energy, 90% less virgin materials and 40% less water.
- It also produces 76% fewer water pollutants, 86% fewer air pollutants and 97% less mining waste.
- It also makes most efficient of natural resources.

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