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### EXPERIMENTAL INVESTIGATION OF LATHE SCRAP AND GGBS IN CONCRETE

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**ABSTRACT-** The paper explains about the experimental study on strength properties of concrete with steel scrap. Steel scrap can be used as fibre which is collected from the lathe industries. Concrete with steel scrap used in construction industry reduces the disposal problem which is generated from lathe industries and dumping of these scraps contaminates the soil and groundwater, which creates a harmful effect to the environment. In addition, to get sustainable development and environmental benefits, lathe scrap with concrete is likely to be used. Test like compressive strength test were conducted and analyse the impact of steel scrap in concrete for 7 days and 28 days were carried out to find out the strength of concrete with steel scrap. Lathe scraps are the dumping materials which are collected from workshops and other steel lathe industries at lowest cost. The effect of steel scrap are similar to the steel fibre but they don't have any regular shape and size. The dimension varies with nature. Scraps considered in this work are 0.5mm thickness. The concrete reinforced with steel scrap naturally which could be used in the construction of structures in zone III seismic areas.

**Keywords-** Properties, Concrete, Lathe scrap, Steel Scrap, Environmental

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#### 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. Lots of local workshops and lathes offer low cost lathe scraps. Lathe industries generate daily approximately 20 kg lathe waste and heavily contaminate the ground water and soil by dumping in the barren lands. The objective of this paper is to do a comparative study of plain concrete and lathe fiber reinforced concrete. Various improvements in properties are noted by the addition of fiber such as crack resistance and prevention of crack propagation, modulus of elasticity, shrinkage reduction and toughness.

The concrete reinforced with lathe scrap provides more compressive strength and also tensile strength while compared to normal concrete used in the construction works. The physical properties of steel scrap provide additional reinforcement. The using of steel scrap from the lathe waste prevents the contamination of the land and provides innovation in the construction field.

## II. RAW MATERIALS

### 1. Cement

Ordinary Portland concrete grade 53, conforming in order to I.S 12269-1987 has been used. Cement acts as a holding agent for materials. Cement is the most pricey materials in concrete and its available in several forms. Any time cement is mixed together with water, a chemical effect takes place therefore regarding which the cement substance sets and hardens into a stone mass. The properties regarding cement that have been studied usually are standard consistency, initial establishing time and specific gravitational pressure

### 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 material which is retained on 4.75mm size IS sieve is termed as a coarse aggregate. Broken stone is generally used as an aggregate. Natural crushed aggregate with maximum size of 20mm is used.

### 4. LATHE SCRAP

Lathe scraps are generally collected from lathe workshops and other industries. These are alike the stainless-steel fiber nonetheless they don't have any regular condition and size. The condition of scrap fiber cross section is rectangular, garbled and metallic bright appearance. The lathe scrap is act as a good fiber in the concrete. To estimate the strength, durability, workability and other characteristics of concrete.

Lathe scraps are the waste materials which are collected from workshops and other steel industries at very minimum cost. They are similar to the sand but they do not have any regular shape and size. The dimension and fineness varies with the nature of source, that is depends upon the types of industries. Every day about 4 to 6 kg of lathe waste are generated by each lathe industries. Only few of them are recycling the lathe scraps waste as a recycled metals, by selling their lathe scraps to recycling industries.



Figure : Lathe scrap

### 5. Ground-granulated blast-furnace slag(GGBS)

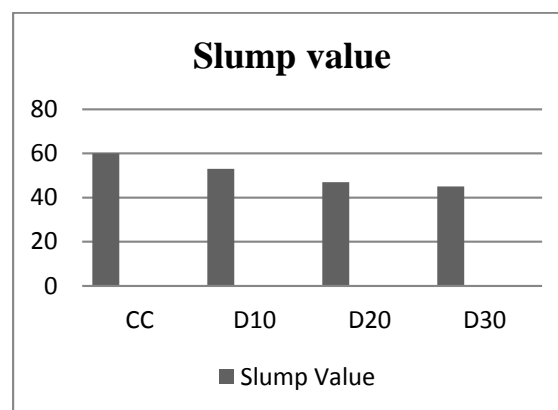
GGBS is obtained by quenching molten iron slag (a by-product of iron and steel-making) from a blast furnace in water or steam, to produce a glassy, granular product that is then dried and ground into a fine powder. It is a granular product with very limited crystal formation, is highly cementitious in nature and, ground to cement fineness, and hydrates like Portland cement. GGBS is used to make durable concrete structures in combination with ordinary Portland cement and/or other pozzolanic materials.

### 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 M25. As per Indian standard . Guidelines the mix design was carried out. The mix proportions of the concrete were 1.4:1.5:3:0.5 (Cement, Fine aggregate, Coarse aggregate and water/cement ratio).The mixing can be done by manual.

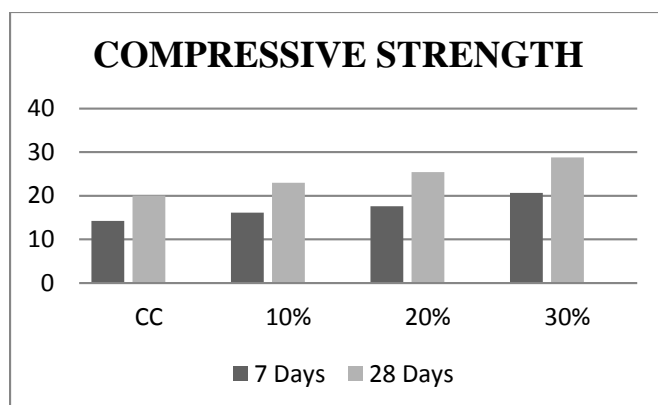
### IV. SLUMP CONE TEST

S.NO	Specimen	SLUMP VALUE (mm)
1.	CC	60
2.	D10	53
3.	D20	47
4.	D30	45



### V. COMPRESSIVE STRENGTH TEST

S.no	Block Type	Size of the specimen (mm)	Ultimate compressive strength (N/mm <sup>2</sup> ) at 7 days	Ultimate compressive strength (N/mm <sup>2</sup> ) at 28 days
1	Normal	150x150x150	14.24	20.06
2	10% + 5%	150x150x150	16.14	23.01
3	20% + 5%	150x150x150	17.58	25.44
4	30% + 5%	150x150x150	20.65	28.78



## VI. RESULT AND DISCUSSION

### 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 10%.

### b) Compressive strength test

The compression strength was determined by using M20 mix of 1.4:1.5:3:0.5 (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%.

## VII. CONCLUSION

Based on limited experimental investigations concerning compressive strength of concrete , the following observations are made regarding the resistance of partial replacement of Lathe scrap and GGBS. From laboratory tests, maximum compressive strength at 7 days obtained is 20.65N/mm<sup>2</sup> and at 28 days obtained is 28.78N/mm<sup>2</sup> , obtained at 30% replacement of fine aggregate with Lathe scrap and GGBS. A better result is obtained when compared with the conventional concrete. Natural resources are not unlimited and also, there is a global need to protect to our environment and preserve our scarce natural resources for next generation. Use of lathe waste in concrete is beneficial as compared to conventional concrete, it reduces the environmental pollution, avoid soil infertility, land filling and environmental hazards created by industrial waste of iron and steel industries as well as providing economical value for the waste material. Environmental effects of wastes and disposal problems of waste can be reduced through this research. A better measure by an innovative Construction Material is formed through this project . This study helps in converting the non valuable Lathe scrap into a strengthen admixture in concrete .

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