

EXPERIMENTAL INVESTIGATION ON CONCRETE USING STEEL SCRAP

L.Kokila¹, B. Madhusudhanan², K. Karpaga Kannan³

¹Assistant Professor, Dept. of Civil Engg, Sethu Institute of Technology, Virudhunagar, India

^{2,3}UG Student, Dept. of Civil Engg, Sethu Institute of Technology, Virudhunagar, India

Abstract - In this project deals with the experimental investigation on concrete using steel scrap. Different proportion of steel scrap fibre by adding admixture of 0,1,2,3% by weight of cement, coarse aggregate and fine aggregate. Metal scrap was collected in lathe. Totally 46 cubes and cylinder 24 cylinders were casted Compressive strength test, water absorption test will be carried out in cubes and split tensile test of concrete has to be tested in cylinder.

Key Words: Steel fiber reinforcement, compressive strength, split tensile and water absorption.

1. 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 utilize the waste material and increasing the strength of concrete .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 tones of lathe scrap obtaining annually. India is the world's 3rd 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.

2. LITERATURE REVIEW

Seetharam. P. G¹, S. Vidhya² 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. 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

3. USEFULNESS AND OBJECTIVES

3.1 Objective:

This study also focus on cost reduction and reducing use of natural sources with parallel enhancement of strength properties of concrete cube and cylinder. Understanding the various aspects in concrete cube and cylinder Perform lab test (compressive test and split tensile test ,etc.)

3.2 Usefulness Of The Project:

Concrete cube and cylinder are made by mixing coarse aggregate ,fine aggregate ,steel scrap and water Increase strength in low cost. Utilizing waste materials

4.MATERIALS AND MATERIAL PROPERTIES

4.1 Cement:

ordinary Portland cement of 53 grade conforming to IS 12269 is used throughout the experimental program. The specific gravity of cement is 3.10 and its compressive strength after 28 days is found to be a 57mpa.

4.2 Coarse Aggregate:

The size of coarse aggregate carried out for the test is 20 mm. The coarse aggregate can be obtained from locally available source. The specific gravity of coarse aggregate is 2.7.

4.3 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 2.56.

4.2 Lathe Scrap:

From the past many researchers during their research work have come across many benefits and barriers. The addition of admixture increase the strength of the concrete by 20% to 30% 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. 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/m³.



Fig.1 Lathe scrap

5. CASTING OF SPECIMEN

Concrete is prepared in the mixture and put in a tray . In these tray required quantity of lathe steel scrap are added and mixed properly. Fresh properties of concrete are determined. The specimens are cast. In the next day, Specimens were demoulded and put in a curing tank.



Fig.2 Casted specimen

6. TESTING

The test results with respect to compressive strength, split tensile and water absorption for control concrete and its containing fibres under Different periods are discussed in this chapter.



Fig.3 Testing of specimens

6.1 Compression Test :

The compression test was used to determine the compressive strength of concrete cubes. The strength of a concrete specimen depends upon cement, aggregate, w/c ratio, curing temperature and age and size of specimen. The compressive strength of mixes after different periods (for 7 and 28 days) is presented in Table. Compressive strength(N/mm²) = p/A .

Table - 1: Compressive Strength Of Cube For 7 Days

S.No	Specimen	Compressive Strength In Mpa	Average Compressive Strength In Mpa
1	NOMINAL (0%)	23.11	22.14
		21.33	
		22	
2	1%	26.3	26.85
		26.75	
		27.52	
3	2%	27.29	27.85
		27.88	
		28.4	
4	3%	21.33	22.01
		22.7	
		22	

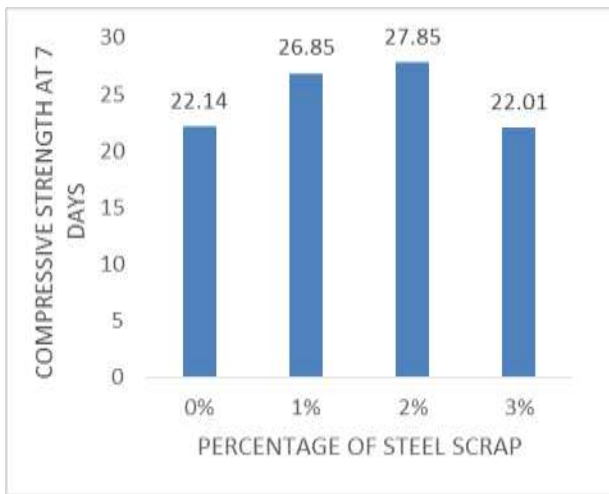


Chart - 1: Compression Strength At 7 Days

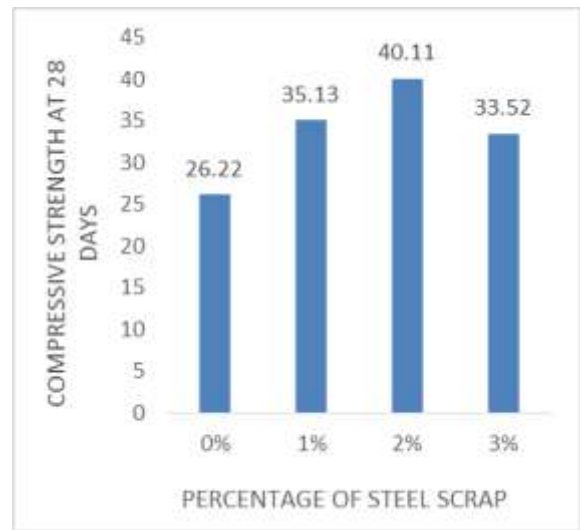


Chart -2: Compressive Strength At 28 Days

Table -2 : Compressive Strength Of Cube For 28 Days

S.No	Specimen	Compressive Strength In (Mpa)	Average Compressive Strength In (Mpa)
1.	NOMINAL (0%)	27.55	26.22
		25.77	
		25.35	
2.	1%	36.22	35.13
		35.68	
		33.5	
3.	2%	40.35	40.11
		39.46	
		40.53	
4.	3%	34.75	33.52
		34.13	
		31.68	

6.2 Split Tensile Test:

The split tensile test was used to determine the tensile strength of concrete cylinders. The strength of a concrete specimen depends upon cement, aggregate, w/c ratio, curing temperature and age and size of specimen. The tensile strength of mixes after different periods (for 7 and 28 days) is presented in Table. Tensile strength(N/mm²) = 2P/πDL

Table- 3: Tensile Strength Of Cylinder For 7 Days

S.No	Specimen	Tensile Strength	Average Tensile Strength
1.	NOMINAL (0%)	2.15	2.17
		2.19	
		2.17	
2.	1%	2.62	2.65
		2.67	
		2.68	
3.	2%	2.80	2.87
		2.84	
		2.94	
4.	3%	2.56	2.58
		2.57	
		2.61	

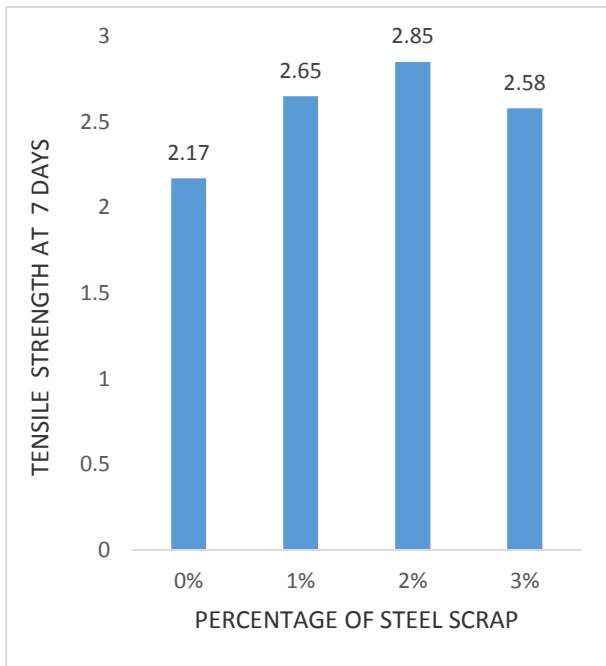


Chart -3: Tensile Strength At 7days

Table -4: Tensile Strength Of Cylinder For 28 Days

S.No	Specimen	Tensile Strength	Average Tensile Strength
1	NOMINAL (0%)	2.61	2.54
		2.55	
		2.47	
2	1%	2.85	2.8
		2.79	
		2.78	
3	2%	2.87	2.85
		2.85	
		2.83	
4	3%	2.75	2.71
		2.83	
		2.57	

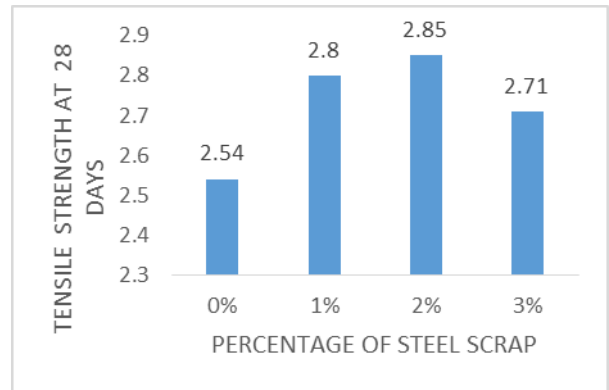


Chart -4 Tensile Strength At 28 Days

6.3 Water Absorption Test:

The specimens were 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. , Water absorption % = $(W_w - W_d / W_d) \times 100$

Table -5: Water Absorption Test Of Cube For 7 Days

S.No	Specimen	Wet Weight W_w	Dry Weight W_d	Percentage (%)
1	NOMINAL (0%)	9.01	8.81	2.2
2	1%	9.18	9.01	1.8
3	2%	9.25	9.13	1.3
4	3%	9.02	8.92	1.1

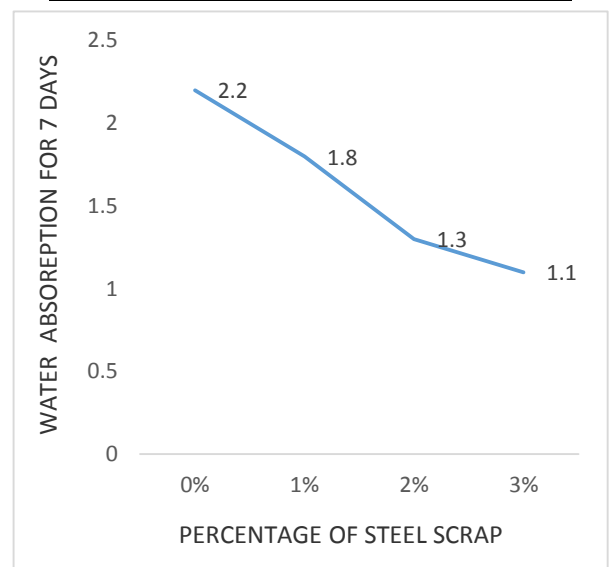


Chart -5: Water Absorption Test Of Cube For 7 Days

Table -6: Water Absorption Test Of Cube For 28 Days

S.No	Specimen	Wet Weight W_w	Dry Weight W_d	Percentage %
1	NOMINAL (0%)	8.99	8.76	2.6
2	1%	9.02	8.84	2
3	2%	9.12	8.96	1.7
4	3%	9.35	9.30	0.5

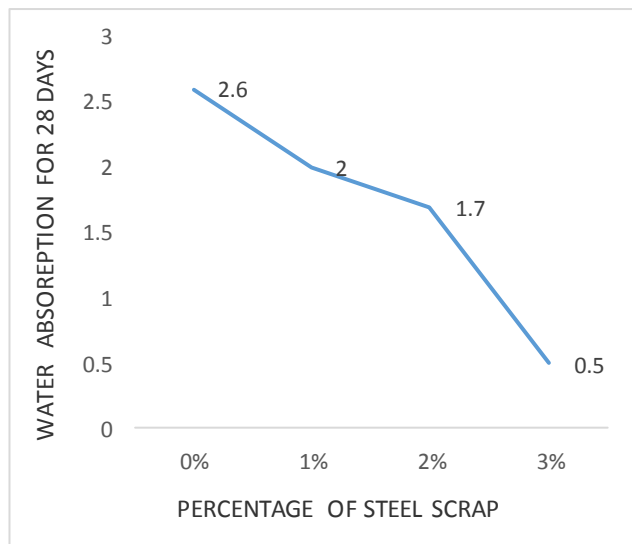


Chart -6: Water Absorption Test Of Cube For 28 Days

7. CONCLUSIONS

In this experimental investigation the steel scrap were added in different proportion 1,2,3% respectively and the results obtained for compressive strength, split tensile strength and water absorption.

It is noticed that upto 2% of steel scrap compressive strength and split tensile strength increases gradually. In further increasing in percentage, the strength got reduced due to creation of gap after casting and also compaction is difficult for increasing the percentage of steel scarp. In water absorption test the absorption of water gradually decreased in addition of steel scrap.

8. REFERENCES

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