A review on use of steel scrap in concrete

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***Abstract*—Nowadays, construction industry is need of searching for economical material which is cost effective and eco–friendly. As per recent market situation, lots of material available for construction and some of are used in construction. The material like Steel, Timber, Concrete, Aluminum, Copper, lime, Silica, Natural Soil etc. used in construction of Residential buildings and other important structures. Concrete is the most suitable material used in construction worldwide because it has durability, high strength, workability and many more properties. We all know that India is a developing country so development of infrastructure consumes large quantity of naturally available material but also construction cost increases. To reduce the cost of construction, people started searching for suitable economic and eco – friendly materials which is used as fully or partially replacement to the ordinary concrete constituents Cement, Sand and Aggregate. By fully or partially replacement natural resources could be saved and can be used in future as per need. In this replacement process, waste material from different industries such as waste glass and its powder, Steel waste, Coconut shells, E-waste, Plastic waste, Marble dust, Paper and pulp mill waste, Sugar cane industry waste etc. used in concrete. The main purpose of study is to check out feasibility of using steel scrap in concrete. For checking feasibility, industrial steel scrap waste can be used by different percentage of weight of concrete. Then after concrete parameters like compressive strength, tensile strength, flexural strength etc. will be checked by testing concrete specimen.**

***IndexTerms*—Waste Steel Scrap, Concrete, Compressive Strength, Tensile Strength, Industrial waste materials**

I. INTRODUCTION

As per rapid Industrialization, steel scraps increasing day to day. These waste generated from Industrial wastes, Automobile waste, constructional wastes, rolling steel mill waste etc. This waste creates serious environmental and waste disposal problems. Thus, waste needs proper management system. On the other hand, government and public pressure demand for action plan for waste management. The disposal of waste steel scrap is an complex issue and can solved by continuous analysis of waste production, monitoring, waste auditing, new technologies, management system, raw material and product improvement [1].

Concrete is the most suitable material which is used in construction worldwide [2]. Concrete is a mixture of cement, sand, aggregate and water. Also, some chemical and admixtures like plasticizer, super plasticizer, water retarders used in concrete to improve properties of concrete. At a present day, different wastes such as fly ash, blast furnace slag, quarry dust, brick bats, broken glass waste and its powder, Steel waste, Coconut shells, E-waste, Plastic waste, Marble dust powder, Paper and pulp mill waste, Sugar cane industry waste etc. can be used in many developed countries [3].

Recently, Reinforced concrete structures are very popular worldwide. R.C.C. structure has good load carrying capacity. Also it has very well resistant against wind and earthquake forces. R.C.C. structures are composite structures which were made from concrete and steel together. Concrete has good compressive strength and steel has good tension strength. So, structure remains stable against various forces. The important R.C.C. structures are Airports, Nuclear plants, Bridges, Dams etc. in India increasing year and year due to privatizations and globalization [3].

This paper presents uses of waste steel scrap from steel industry which improves various properties of concrete. Use of suitable aspect ratio, dimensions, specific gravity of steel scrap fiber percentage by weight of concrete, construction cost can be reduced and good quality, strength, durability of structure can be achieved.

II. OBJECTIVES OF STUDY

- Use of Steel scrap in concrete.
- To study effect of waste steel scrap in concrete.
- To establish the alternatives of ingredients of concrete.
- To check the feasibility of waste steel scrap in concrete.
- To check feasibility various tests done on prepared concrete specimen like compressive strength, Split tensile strength, Flexural strength etc.
- To compare test results with conventional concrete.

III. Previous Research Review on Use of Steel Scrap In Concrete

1. Joshi et al. (2014) suggested use of steel fiber reinforced concrete in pavement to improve properties of concrete andreduce shrinkage and cracks [4].
2. Yadav et al. (2014) researched on use of steel scrap in pavement concrete and hence reduction in reinforcement of pavement. Also, use of steel scrap reduces the construction cost of pavement [5].
3. Rajeev et al. (2015) identified use of scrap material like binding wires, steel nails, and lathe waste steel fiber in M-25 grade concrete with various percentages by weight of concrete. 162 prepared specimens tested and result showed that steel scrap has good compressive and tensile strength than conventional concrete, thus steel scrap fiber can be used for production of steel fiber in Industry [1].
4. Kumar et. al.(July 2015) analysed steel solid waste recycling and reuse, waste management practice, waste generation so that effects of solid waste from steel plant reduces on the earth [6].
5. Balaji Praveen et al. (2016) found out plastic waste and lathe waste both can be used together in concrete making. For checking feasibility, author casted 36 nos. of concrete cubes and cylinders with 1.5% of lathe waste and different % of plastic waste to the weight of concrete. The study show that 0.2 to 0.4% plastic with lathe waste improves compressive strength and 0.6 to 0.8% plastic with lathe waste improves split tensile strength of concrete [7].
6. Qureshi et. al. (2016) carried out experimental investigations to determine strength characteristics of concrete reinforced with lathe machine scrap. The purpose of research to find out optimum percentage of lathe machine scrap in concrete up to which mechanical properties of concrete like compressive strength, split tensile strength, flexural strength can be increased. The experiment results shows that compressive strength, split tensile strength and flexural strength increased up to 1.5% by weight in concrete after this slight reduction in concrete properties [8].
7. Patil et. al. (2016) carried out experimental investigation to determine compressive strength of concrete reinforced with waste lathe scrap. At the end of experimental study, authors conclude that the compressive strength of the concrete increasing the proportions of the lathe scrap up to 0.8 for 14 days to 1.2% for 28 days. The fiber range 1.2 to 2% causes slight decrease in 28 days compressive strength [9].
8. Solanki et. al. (2011) present a paper on use of steel fiber in many effective ways to improving the strength and an improvement in fatigue life of the pavement together with developing improved resistance to crack , thus being considered as cost effective technology and design of road construction. Authors suggested use of steel fiber for effective pavement construction positively [10].
9. Mittal et. al. (2016) presented paper on strength properties of rigid pavement concrete with use of steel fiber and marble dust. Also, review that combination of 20% of marble dust with addition of 0.5 to 1% steel fiber is ideal for rigid pavement [11].
10. Mathew et. al. (2015) carried out experimental study on fiber reinforced concrete using lathe scrap fiber. The tests slump test, compressive strength, split tensile strength and flexural strength were conducted on M 30 grade concrete specimen cubes, beams, cylinders at 7 and 28 days. Test results show that additional 1% of lathe scrap improves strength of concrete [12].

IV. Conclusion

After completing research, we conclude that steel scrap can be used effectively to improve properties of concrete. Steel scrap also improves properties of concrete such as compressive strength, split tensile strength and flexural strength.Use of steel scrap by percentage weight of concrete reduces cracks and shrinkage in concrete. Steel scrap reduces the consumption of reinforcement in R.C.C. structures.Steel scrap fiber concrete is better than conventional concrete.

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