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Effect of Steel Fibres and Crumb Rubber on the Properties of Concrete

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ABSTRACT
India has completed a noteworthy jump on building up the frameworks, for example, structures development, express parkways, control ventures and modern structures, dams, and so forth to meet the prerequisites of globalizaon. For the development of structural building works, solid assume primary job and an expansive quantum of cement is being used. Both coarse total and fine total is a noteworthy establish ulized for making ordinary cement, has turned out to be exceedingly costly and furthermore rare. In the background, there is expansive interest for elecve materials from squanders. Squander res administraon is a genuine worldwide concern. A huge number of waste res are created and dumped or consumed each year, regularly in an uncontrolled way, causing a noteworthy ecological and medical issue.
Keywords- Crumb rubber, Scrap steel fibre, Rubberized concrete, Compressive strength, Split tensile strength, workability.

I. INTRODUCTION

India has completed a noteworthy jump on building up the frameworks, for example, structures development, express parkways, control ventures and modern structures, dams, and so forth to meet the prerequisites of globalizaon. For the development of structural building works, solid assume primary job and an expansive quantum of cement is being used. Both coarse total and fine total is a noteworthy establish ulized for making ordinary cement, has turned out to be exceedingly costly and furthermore rare. In the background, there is expansive interest for elecve materials from squanders. Squander res administraon is a genuine worldwide concern. A
huge number of waste res are created and dumped or consumed each year, regularly in an uncontrolled way, causing a noteworthy ecological and medical issue.

1.1 Waste tyre rubber
Dumping of waste tyre rubber on land represent a noteworthy natural issue of expanding importance. Over the years, disposal of waste res has turned out to be one of the difficult issues for the earth. Imaginave answers for take care of the re transfer issue have for some me been being developed.. One of the successful strategies for use of these materials is their ulizaon in concrete. Crumb rubber is thought to be a potenal material for use in concrete technology.

1.2 Scrap steel fibre

When we use steel reinforcement the tensile strength of concrete increases. Research followed by technological developments have enlightened us with ways to add fiber to strengthen concrete. In this invesgaon lathe waste material that is locally available. The steel scrap material which is obtained from the lathe can be used as steel fiber for the innovave construcon industry and in pavement consrucon.

II. MATERIAL USED

2.1. CEMENT: OPC 43 grade cement has been used in this study.

2.2. COARSE AGGREGATE: Coarse aggregate of 20mm and 10 mm were used. The specific gravity of aggregate is 2.45.

2.3. FINE AGGREGATE: Locally available sand has been used in this study. It confirms to zone II with a specific gravity of 2.59.

2.4. CRUMB RUBBER: The rubber in powdered form has been used in this study with a specific gravity of 1.15.

2.5. SCRAP STEEL FIBRE: Lathe waste material has been used as steel fibre. The aspect rao was not always constant. The diameter varies from 0.3 to o.75mm.

III.METHODOLOGY

3.1. GENERAL

This invesgaon includes design of concrete mix of medium strength concrete. In this study design mix used is M35. The guidelines given in various codes like SP: 23-1982, IS:102621982 AND IS:456-2000 have been adopted for mix design of concrete. In this study fine aggregate is replaced with crumb rubber with different percentages of rubber and compute the strength and then steel fiber is used with 2% fracon
with different percentage of rubber and then strength of this concrete is used.

3.2. BATCHING, CASTING AND CURING

All the dry materials are put in the mixer. Then mixer is rotated and cement is added to it. At last water is added to it and mixing is connued ll a uniform mixture is produced. Then, concrete specimens of standard cube mould of size 150 x 150 mm were casted in different batches having different replacement of crumb rubber. similarly, cyclindrical mould were casted in different batches. Aer casng, curing process is done at normal temperature.

3.3. MIX PROPORTION

Concrete mix of strength of M20 has been designed and modified with (2.5%, 5%, 7.5%, 10%) scrap steel fiber and varying percentages of crumb rubber (2.5%, 5%, 7.5%, 10%) by weight of fine aggregate. There were two basic mixes; rubberized concrete mixes(RC) and steel fiber reinforced rubberized mixes(SFRRC). The control mix in this study is designated as NC.

IV.RESULT ANALYSIS

4.1. GENERAL

This chapter deals with the results of various mechanical properes rubberized concrete and steel fiber reinforced rubberized concrete and the result are compared with the results of convenonal concrete. In this present study, the workability test, the compressive strength test, split tensile strength were tested.

4.2. COMPRESSIVE STRENGTH TEST

The result obtained for cube compressive strength for different mixes at 7 days and 28 days. In this experiment, the compressive strength showed a decreasing curve when the percentage of crumb rubber is increased. The 28

compressive strength of normal concrete obtained is 45.50MPa. When the percentage of crumb rubber varied from 5-10% the strength reduced by 10-15%. When scrap steel fiber is added to the mix there is very low reducon in compressive strength. When the crumb rubber percentage varied from 5-10 in steel fiber mixes, the strength reduced only by 10-15%. In general, steel fiber rubberized concrete mixes shows higher compressive strength than rubberized concrete mixes.

20%	45%

For 28 days, result .

4.3. SPLIT TENSILE STREMGTH TEST

The split tensile test of normal concrete at 28 days obtained is 4.45. With the replacement of crumb rubber the strength is reduced by 30%. With the addion of scrap steel fibers this shows an increase in the strength. Steel fiber rubberized reinforced concrete mixes shows beer result than rubberized concrete mixes.

20%	46.5%

V. CONCLUSION AND FUTURE SCOPE

5.1. CONCLUSIONS

The following conclusion can be drawn from this study:

1. The compressive strength, split tensile strength decrease with the increase in the rubber content. This can be reduced by adding the steel fibers to it. Steel fibers shows higher compressive strength.
2. In rubberized concrete , when the rubber content varied from 3-12% the compressive strength reduced by 5-35%. But in the case of steel fiber concrete mixes
3. when the crumb rubber varied from 3-12%, the compressive reduced to 2-15%.
4. In rubberized concrete , the compressive strength with 3%replacement shows higher compressive strength than normal concrete.
5. In compressive strength SFRRC3, SFRRC6 and SFRRC 9 shows higher compressive strength than normal concrete.
6. In split tensile test, with the increase in rubber content there is decrease in split tensile test, but SFRRC3 AND SFRRC9 shows higher spilng tensile strength than the normal concrete.

5.2. FUTURE SCOPE

1. This study can be extended by increasing the percentage of rubber aggregate in the given design mix.

2. This study can also be done by using different grades like M40,M45 etc. for different types of percentage or by using the same given percentage.
3. More test can be performed for this study like flexure strength test, abrasion resistance , impact resistance test.

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