Comparative Study of Concrete Mix Design by Adding Various Types of Admixtures

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Abstract - **Concrete reserved their seat in today's modern materials. Concrete is a material used in building construction, consisting of a fine aggregate and a coarse aggregate that is bonded by cement and water with various types of admixtures which are available in market or from the waste materials. A mix design procedure for high-performance concrete mixes has been presented in this paper. Since economical parameters and compressive strength are fundamental properties of concrete in two different stages of production, the correlation between costing parameters and compressive strength has been used instead of using water-cement ratio versus compressive strength relationship. If we maintain the water-cement ratio and by adding various types of admixtures in concrete we can improve the compressive strength of concrete and also get more strength which will be very economical. In the proposed method, the designer is able to estimate parameters like compressive strength and economical costing at the design stage for a given target strength, in addition to ingredients of concrete.**

Keywords - **Concrete mix design, Economical Admixtures Steel fiber, glass fiber, SBR-Latex Rice straw, Pieces of cement bags**

I. INTRODUCTION

The process of selecting suitable ingredients of concrete and determining their relative amounts with an objective of producing a concrete of required strength, durability, and workability as economically as possible is termed as concrete mix design. Here we are doing concrete mix design of M25 grade by adding various types of admixtures and get more strength as well as it's become economical mix design as far as cost is concern.

II. ADMIXTURES

- A material, other than cement, water, fine and coarse aggregates that is added in small quantity to the concrete, either before or during mixing
- An optional ingredient added to achieve specific engineering properties of concrete
- Capable of improving the properties of fresh as well as hardened concrete that cannot be achieved economically by any other means
- Used to modify the properties of ordinary concrete so as to make it more suitable for any situation and applications

Important Reasons for using Admixtures
- Reducing the cost construction
- Save the cement
- Developed high strength and durability
- It is make the concrete from normal to special concrete
- Ensure the all types of quality; maintain finishing, mixing, strength towards the climate conditions.

1. Steel Fiber

Steel fibres are filaments of wire, which can use as admixtures. Steel fibers are a material of wastage of steels and make small pieces from the whole rode of steel. It is also called as solid admixtures.

Applications
- cellar walls
- liquid tight floors
- joint less floors on
- industrial floors vibro
- foundation slabs

Fig 1 Photo-2-Steel Fiber

2. Glass Fibre

Glass fibres also called fiberglass. It is material made from extremely fine fibers of glass glass fibers is a lightweight, extremely strong, and robust material. Although strength properties are somewhat lower than carbon fibre and it is less stiff, the material is typically far less brittle, and the raw materials are much less expensive. Its bulk strength and weight properties are also very favourable when compared to metals, and it can be easily formed using moulding processes.

Fig 2 Photo-3-glass Fiber

3. SBR LATEX (Bonding Admixture)

SBR LATEX is a carboxylate styrene butadiene copolymer latex admixture that is designed as an cement bonding agents and concrete to improve bond strength, tensile strength, compressive strength and chemical resistance. It is also use as waterproofing agent

Features / Benefits

- Improves bond strength
- Increases durability under freeze/thaw cycling
- Resistant to dicing salts
- Reduces cracking Increases mortar wear resistance under rubber wheeled traffic
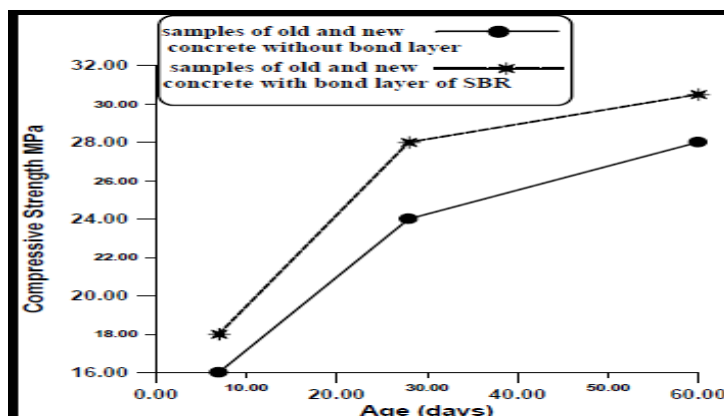- Increases mortar tensile strength

Fig 3 Photo:4 SBR Latex

Fig 4 Graph of SBR latex admixture

4. Economical Admixtures

Rice Straw and Pieces of Cement Bags:

- It's an economical admixture which is use in concrete mix design and gets more strength.
- Pieces of cement bags is one the most economical admixtures which can give more strength with lower cost.
- There are many types of economical admixtures used in day to day life like E-WASTE materials (cds, roll of cameras etc..)
- By adding various types of admixtures in the concrete we can improve the strength and also design a concrete in lower budget by using economical admixtures.

Fig 5 Photo-5-Rice Straw
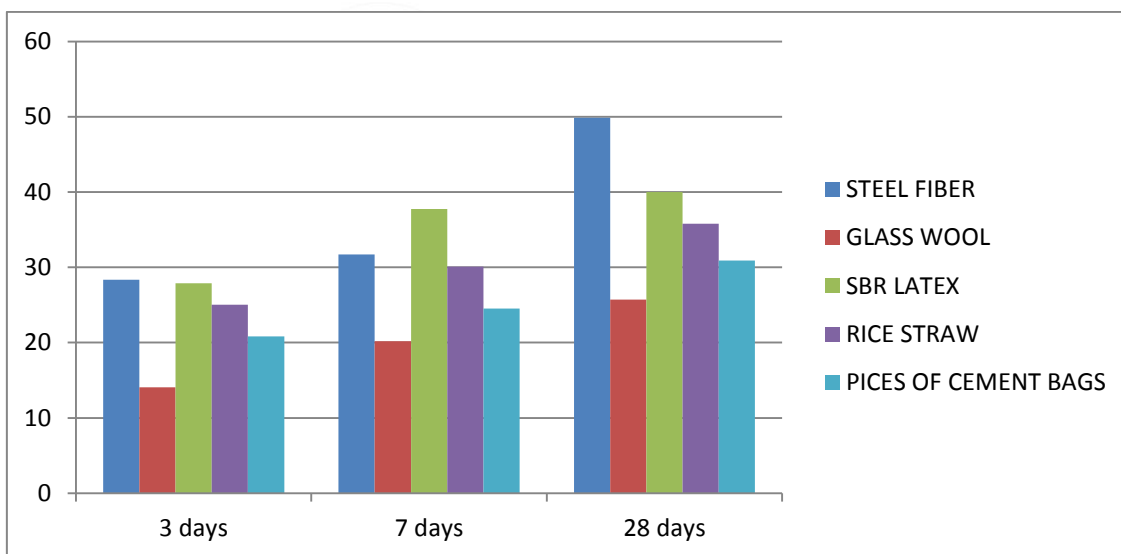
III. RESULTS AND DISCUSSION

Fig 6 Graph of comparision

Comparison Table of Admitures

NAME OF ADIMXTURES	3 DAYS	7 DAYS	28 DAYS	COST OF ADMIXTURES	M25 strength 28 days	M15 strength 28 days
STEEL FIBERS	28.33	31.69	49.84	125/kg	49.84	33.22
GLASS WOOL	14.07	20.20	25.72	50/125gm	25.72	17.14
SBR LATEX	27.86	37.73	40.01	150/lit	40.01	26.67
RICE STRAW	25.03	30.09	35.80	ECONOMICAL ADMIXTURES	35.80	23.86
CEMENT BAGS PIECES	20.83	24.53	30.91	ECONOMICAL ADMIXTURES	30.91	20.60

IV. CONCLUSION

As per the results steel fibre give more strength to the concrete but its cost is higher, so instead of steel fibre we can use the rice straw and pieces of cement bags and get enough strength.

Here we are getting more strength than the require strength in M25 grade so we can reduce the grade like M15 and get the target strength. We take

Target strength: 30

Thus, for target strength: 30 we can use this type of mix design by adding various types of admixtures in grade of M15 and mix design become economical

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