Experimental Investigation on Bendable Concrete

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Abstract- *Bendable concrete is commonly known as Engineered Cementitious Composite (ECC). Over the years tremendous work has been carried out in creating bendable concrete. In the present project different characteristics of bendable concrete are assessed by cementitious material such as fly ash, PVA fibre. With the active development of society as skyscrapers, long-span structures are progressing there is an higher demand in building materials having high strength and ductility.*

This project includes flexural test and compression test. An optimum sizes and proportion of fine aggregates to be used in making of this concrete. ECC is compared with conventional concrete with respect to its cost. Bendable concrete is special type of concrete hence there are no India Codes available. This is pure and trial error based method

Keywords- Bendable Concrete, ECC, Conventional concrete, Flexibility, Glass fibre

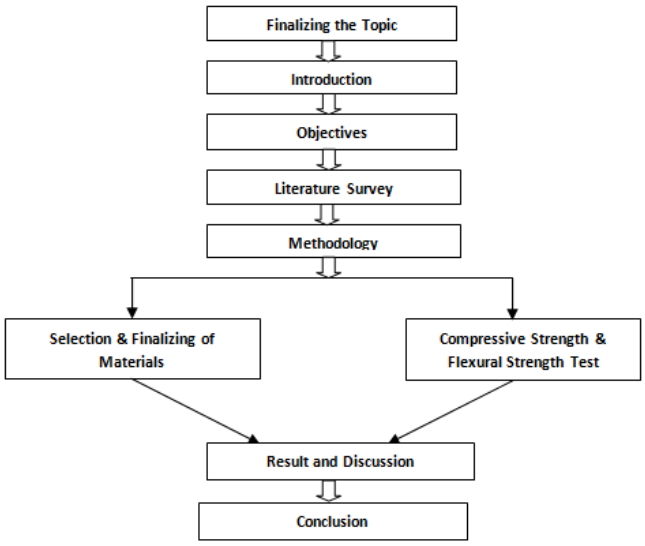
I. INTRODUCTION

Development of special type of concrete i.e Engineered Cementitious Composites (ECC) also known as bendable concrete which has very high flexural strength as compared to conventional concrete allowing the concrete to bend without cracking under heavy loads. Engineered Cementitious Composites (ECC) was developed by professor Victor Li of michigan university in early 1990s.Bendable concrete consists of all ingredients of conventional concrete except course aggregate and is reinforced with Polymer Fibers.

Concrete is widely used in todays construction industry, it can take compressive load very effectively but the main problem is this concrete cannot take much tensile stress. As it fails under tensile load the bendable concrete seems to be good solution for this problem if it can give desired flexural strength. In some countries such as Japan, Korea, USA, etc the flexible concrete is used in many structures. But in India, it is still unexplored. The bendable concrete can be used as precast concrete which can reduce cost of project.

II. METHODOLOGY

Following are the steps involved: Research and discussion for project selection. Finalizing a topic after discussion and advice of project guide. Collecting of data for detailed study of the project. Planning and scheduling of project tasks. Preparation of report and presentations.



Materials

Cement, Crush Sand, Water, GlassFiber, Admixture (Technoplast 4480)

Properties

Glass fibre: It is a material made up of several fine fibres of glass. The product is one of the most versatile industrial materials known today. It has comparable mechanical properties to other fibres such as carbon fibre and polymers. Glass fibre is used as a reinforcing agent for many polymer products in order to form a very durable and lightweight material, known as fibreglass. Fibreglass offers some unique advantages over other materials due to its thickness, weight and strength. With such a wide range of properties, the material can satisfy design and project objectives in many industrial applications. High tensile strength. Glass has greater tensile strength than steel wire of the same diameter, at a lower weight. Dimensional stability. Glass fibre is not

sensitive to variations in temperature and hygrometry. It has a low coefficient of linear expansion.High heat resistance. Glass fabrics retain 50% of room temperature tensile strength at 370°C, 25% at 480°C, a softening point of 845°C and a melting point of 1,135°C.Good thermal conductivity. Glass fibres are great thermal insulators because of their high ratio of surface area to weight. This property makes it highly useful in the building industry. Great fire resistance. Since glass fibre is a mineral material, it is naturally incombustible. It does not propagate or support a flame. It does not emit smoke or toxic products when exposed to heat. Good chemical resistance. Glass fibre is highly resistant to attacks by most chemicals. Outstanding electrical properties. Glass fibre has a high dielectric strength and low dielectric constant. It is a great electrical insulator even at low thicknesses. Dielectric permeability. This property of glass fibre makes it suitable for electromagnetic windows. Compatibility with organic matrices. Glass fibre can vary in size and has the ability to combine with many synthetic resins and certain mineral matrices like cement. Great durability. Glass fibre is not prone to sunlight, fungi or bacteria. Non-rotting. Glass fibre does not rot and remains unaffected by the action of rodents and insects. Highly economical. It is a cost-efficient choice compared to similar materials.

III. RESULT

At 14 Days			
	Comprassive Strength(N/mm²)	Weight (kg)	Rate (Rs.)
Conventional Concrete	26	9.18	5740
ECC	20.37	8.256	11205

At 28 Days			
	Comprassive Strength(N/mm²)	Weight (kg)	Rate (Rs.)
Conventional Concrete	30	8.78	5740
ECC	31.28	7.9	11020

At 9 Days			
	Flexural Strength(N/mm²)	Weight (kg)	Rate (Rs.)
Conventional Concrete	2.6	44.94	5740
ECC	3.53	40.54	11020

Compression test for 28 days using 1% fibre : 31.28 N/mm²
Compression test for 14 days using 1% fibre : 20.37 N/mm²
Flexural test for 9 days using 1% fibre : 3.53 N/mm²

IV. CONCUSION

Multiple tests were conducted and after detailed study of the test results following conclusions can be made,After compression test and flexural test of ECC the results are compared with conventional concrete.ECC has greater strength and flexibility than conventional concrete.ECC has greater crack resistance.When compared to conventional concrete then weight of ECC is less than 10-15%.Cost of 1m3 ECC is found to be 2 times when compared to the cost of 1m3 of conventional concrete.

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