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Strengthening of Prefab Slab using Fiber Reinforce Composites

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ABSTRACT

The main objective of using strengthening of pre fab slab by wraping with frp to to make it more durable during shock as a modification for the prevention of shrinkage cracks. The aim of research is to strengthening of Pre-fab structures slab using glass fiber reinforced composites. Slabs will act as structural members; provide a sensible application for the new material because they can be casted as load bearing and non-load bearing concrete members

Keywords

Glass fiber Reinforced concrete, GFRC, Structural concrete SLAB. Tensile test, Flexural test, Compression test and Load test.

1. INTRODUCTION

In the recent area of civil structure Engineering high profile structures are constructed all over world. According to the day by day demand of society and to satisfy all kind of challenging problem. So the research work in civil structure is all time over worldwide. By looking the past of civil engineering there is lot of mistakes and problems due to the old design codes. Out of the problem the vital problem is strengthening the concrete structures i.e. result of damage & deterioration & serviceability of the structure.

So to reduce the problem & to strength the concrete structure we have a research work on the GFRP sheet laminates on slab. Glass fiber reinforced polymers (GFRPs) is a fiber reinforced polymer made of a plastic matrix reinforced by fine fibers of glass. Fiber glass is a light weight, strong and robust material used in different industries due to the excellent properties. Glass fiber reinforced composite replacing the traditional materials because of its superior properties such as high tensile strength, low thermal expansion, high strength to weight ratio.

In the new strengthening technique GFRP sheets are apply externally bonded reinforcement, on the pre cast slab.

The wrap work is done layer by layer (4 layers & 8 layers). Then we check the result conducting important parameter of testing i.e. flexural, tensile, compressive and load test. The results obtained were compared with only concrete material and 4 and 8 layer of GFRP on the basis of strength and deformation & stress distribution and deflection and cracking point.

2. ABOUT GLASS FIBER REINFORCE (GFRP)

Composite materials produce a combination of two or more materials that cannot be achieved by either Fiber or Matrix when they are acting alone. Fiber reinforced composites were successfully used for many decades for all engineering applications. Example of some vital Fiber is - Glass Fiber, Carbon Fiber, Basalt Fiber etc. Glass Fiber reinforced polymeric matrix comprised organic, polyester, thermostable, vinylester, phenolic and epoxy resins.

The Mechanical behavior of a Fiber- reinforced composite basically depends on the Fiber strength and modules, the chemical stability, matrix strength and the interface bonding between the Fiber/Matrix to enable stress transfer the functional characteristics of suitable composition and desired properties of GFRP composites was equal to steel had higher stiffness than aluminum and specific gravity was one-quarter of the steel. The GFRP Fibers like woven mat, chopped mat have been produced to enhance the mechanical and Tribological properties of the composites.

2.1 Preparation of Glass Fiber composite (woven mat)

GF in composite stronger reinforcement thickness and cross sectional area was different for each specimen. Maximum tensile strength observed in three ply reinforcement, higher VF number of layer of fibers increased the strength and stiffness of the composite.

Fig.1

Fig.2

1. Hot press technique
2. Mixing and moulding, melting moulding
3. Compression moulding
4. Hand lay-up method follows by hydraulic press

TABLE-1 Physical and Mechanical properties of Glass Fiber

Fiber	Density g/cm^3	Tensile strength GPa	Young's modulus (GPa)	Elongation (%)	Ref.
E-Glass	2.58	3.445	72.3	4.8	17
C-Glass	2.52	3.310	68.9	4.8	
S_2 Glass	2.46	4.890	86.9	5.7	