

**A LITERATURE STUDY ON GFRG AND GFRP**

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Abstract - The main purpose of this literature study is to provide the basic information of GFRG (Glass Fibre Reinforced Gypsum) and GFRP (Glass Fibre Reinforced Polymer). GFRG is a new building product used in many buildings as rapid walls, panels, partition walls, exterior as well as in interior. GFRP is also a new product basically the material used is glass. It can be used as building material as well as in off shore civil engineering structure such as deck panels, berthing structures and many other purpose. In this literature paper highlights the most recent application of GFRG and GFRP.

Keywords: GFRG, GFRP, Off shore civil engineering structures, marine structures.

I. INTRODUCTION

Glass Fibre Reinforced Gypsum (GFRG) is a recently developed building product. It is manufactured using Gypsum as a core material. In the civil engineering field GFRG is used mainly as panels like load bearing walls, partition infill walls, mass housing, multistoried buildings. It is a cost effective building product used for mass scale affordable housing. It can be load bearing or non-load bearing wall panels. In this panel can be used as walls and floor slab or as roof slab. The application of GFRG areas panels, beams, columns, ceilings etc. By the use of GFRG many benefits can be achieved they are very fast construction, Reduced hassle of construction with less material, cost saving, fire resistant, strong, quality construction, less maintenance cost, corrosion free, light weight etc.

GFRP (Glass Fiber Reinforced Polymer) is also known as Glass Reinforced Plastic (GRP). It is made of glass. GFRP is a light weight, weather resistant extremely strong and robust material, corrosion resistant, low moisture absorption, low thermal conductivity. GFRP construction is rapidly growing because of its low self-weight and its long life. In this the GFRP can be used in many ways in building as facades, floors, beams, columns, berthing structures, bridges in coastal region, offshore oil platforms, deck panels, storage tank, septic tank, telecommunication, automotive industry, gas system etc. it is an ideal material for exterior use.

II. LITERATURE REVIEW PAPER**A. Static Analysis of GFRG and Conventional Multistoried Building Using ETABS**

Author: Athulya R Prasad, Assistant Prof. Namitha Chandran

Published in: International Journal of Science Technology & Engineering (IJSTE)

Year: June 2016

Objectives: In this paper comparative study of conventional buildings and GFRG (Glass Fibre Reinforced Gypsum) have been carried out. Here equivalent static analysis of G+7 storied have been carried out to evaluate the story drift, story displacement and base shear.

Methodology: A typical plan for a proposed building at RCF, Mumbai is considered height of 24 m. Here Static and Dynamic analysis of both G+7 storied building is carried out. The main objective of the study was comparison of GFRG and conventional building. The plan lay out of all the building model is kept as same. Study has been done on different models using ETABS software. A typical cross section of GFRG panel is shown in figure 1.

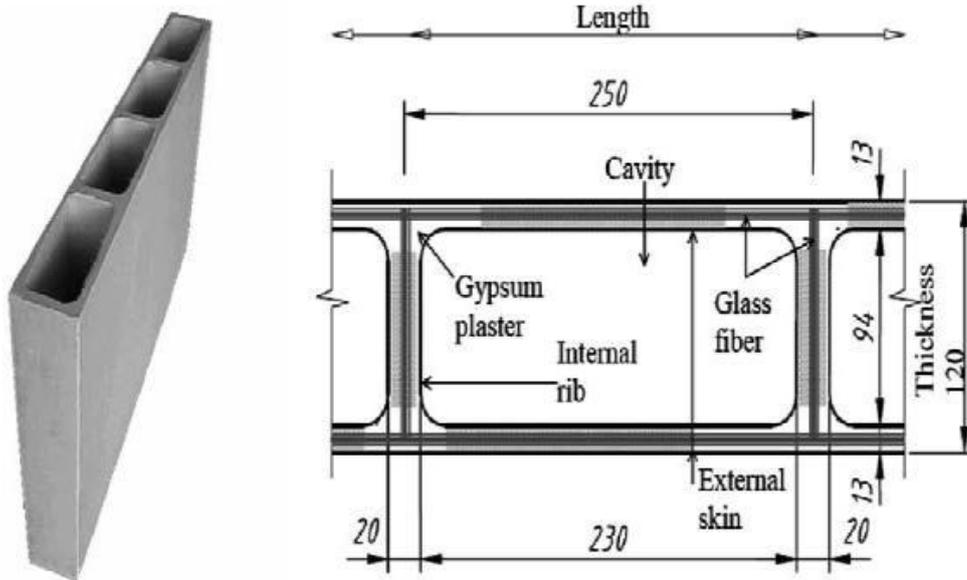


Figure 1 GFRP panel and its cross section

Conclusion : GFRG building perform good in terms of least story displacement,story drift and base shear when compared to conventional building.The story displacement and story drift of both GFRG and conventional building are within the permissible limits.Static analysis is not sufficient for high rise building and it is necessary to do dynamic analysis.

B. Dynamic Analysis of GFRG and Conventional Multistoried Building Using ETABS

Author :Athulya R Prasad,AssistantProf.NamithaChandran

Published in : International Journal of Engineering Science and Computing (IJESC)

Year:July 2016

Objectives: In this paper comparative study of GFRG (Glass Fibre Reinforced Gypsum) and conventional buildings have been carried out.Itfocus on Response spectrum and Time history analysis of G+3 storied,toevaluvate the story displacement,story drift and time period.

Methodology : A typical plan for a proposed building at RCF,Mumbai is considered height of 12m.Here Dynamic analysis of both G+3 storied building is carried out.The main objective of the study was comparison of GFRG and conventional building.The plan lay out of all the building model is kept as same.Study has been done on different models using ETABS software.

Conclusion : GFRG building perform good in terms of least story displacement,story drift and time period when compared to conventional building.The story displacement and story drift of both GFRG and conventional building are within the permissible limits.It is observed that the displacement obtained from time history analysis is higher than response spectrum analysis.Time period of conventional building is more as compared to GFRP building.

C. Testing and evaluation of GFRP composite deck panels

Author : P Alagusundaramoorthy,RVeeraSudarsana Reddy

Published in: Science Direct

Year: 2008

Objectives: In this paper studied about the load deflection behaviour of Glass FibreReonforced Polymer (GFRP) composite deck panel under static loading.

Methodology : The deck panels were analysed using ANSYS software.Here three prototype of composite deck panels are used each with assize of 3000 mm x 1000 mm x 300mm were fabricated using hand lay upprocess.Maximum deflection and strain at factored load and flexural and shear rigidities were calculated in FE analysis and compared with the experimental data and also with the specification given by the Ohio Department Of transportation (ODOT).

Conclusion : From this study it is concluded that the fabricated GFRP deck panels satisfied the performance criteria specified by ODOT and can be used in berthing structure, bridges in coastal region,off shore oil platforms, OTEC systems and also in seismic prone area.

D. GFRP bridge deck panels

Author : M Vovesny and T Rotter

Published in:SciVerse Science Direct

Year : 2012

Objective: Design and analysis of new bridge deck panel made of Glass Fiber Reinforced Polymer (GFRP).

Methodology : Design of deck panel will be done on the basis of loading experiments and FEM analysis. In this paper numerical analysis of the panel was performed in the FEM software ABAQUS to determine the stress in the panel and deflection by the design load. Deck panel is fabricated by the manual joining of I beams with top and bottom laminated panels. The cross-section of deck panel and its dimensions are shown in the figure 2.

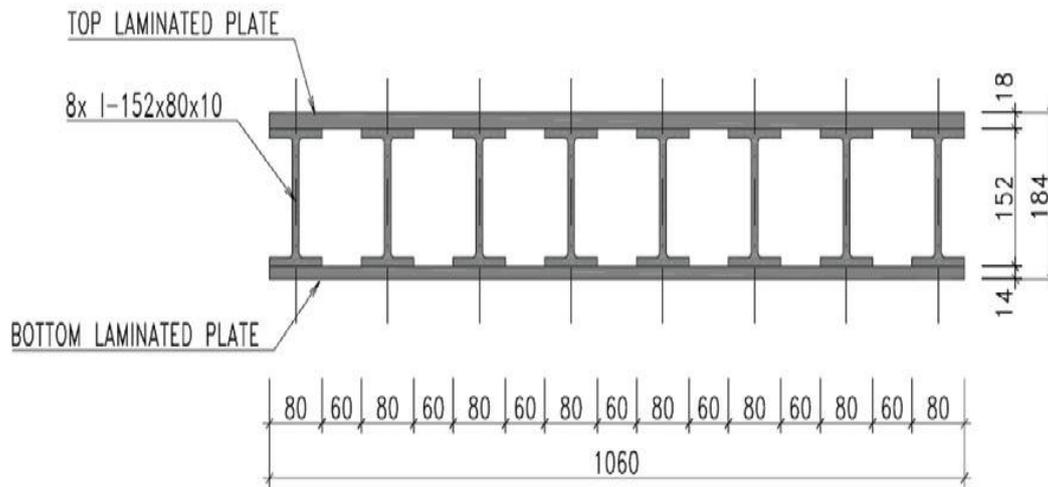


Figure 2 .Cross-section of deck panel

Conclusion : Numerical analysis and physical tests carried out on designed deck panel it proved that this type of deck panel has sufficient strength to be used for construction of temporary bridges.

E. Design and optimization of a GFRP panel for building construction

Author: GuglielmoCarra

Published in: ACEE

Year: 2011

Objective: In this paper contains the design and optimization of GFRP (Glass Fibre Reinforced Polymer) load bearing panel that maximizes the structural response with respect to concentrated and distributed loads even of great intensity. The main objective of this study is to quantify the maximum height of building entirely made up of GFRP panels.

Methodology: The structural analysis is carried out in FEA software ABAQUS. GFRP panels are designed based on the highest Italian standard. Panel is designed as an integrated element. It is provided as a double derivation as one for wall and one for floors.

Conclusion: It reveals that the panel is capable of supporting the weight of a 15 storey building. After the simulation it is proved that the GFRP panels allow to reach heights comparable to those of traditional building made by concrete or brick.

III. CONCLUSION

In this paper after the study of different literature review the use of GFRG and GFRP panel have better performance as a building panel product because of its easiness to use and many properties. GFRP deck panel can be used effectively in offshore structures such as pontoons, floating docks, oil drilling platforms because the GFRP performs better in terms of resistance to corrosion in aggressive environment, good fatigue strength, high stiffness to weight ratio, reduce maintains cost and the greater capacity.

IV. REFERENCE

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