Total Deformation of Different Composite Bricks, a Numerical Study

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Abstract **- Now day's waste products are generated at high level due to different industrial operations. These waste products can be used with composites to make bricks that can be used in the civil construction. The numerical studies of total deformation were of different composites were done. Studies were performed using ANSYS STUDENT 16.2 (6 month licence). The results predicts that the concrete act as a better material with respect to Epoxy_resin, PVC Foam and Resin_polyster. Total deformation contour were plotted using ANSYS STATIC STRUCTURAL 16.2 (student version).**

Keywords: Composite, Ansys Static Structural 16.2 (student Version), Total Deformation

I. INTRODUCTION

Pollution that is due to the human activities has put a very bad effect on the environment that life is about to face unexpected calamity. At present, the industrial wastes are in many forms like gases, liquid and solid that affects soil, water atmospheric environment and human health in very bad way. If we are able to use these industrial wastes into useful things then it will be very effective in reducing the pollution to a great extent. Different types of solid wastes are produced during the industrial processes which can be use in the formation of different kind of composite

Composite Based Bricks: In this study different composites are used as concrete, Resin Polyster, Epoxy Resin and PVC Foam. As we are aware that a standard brick start to break at 150KN force. So, we have seen in the study that the deformation in composite based bricks is very less as compared to the normal bricks when the same amount of force is applied to it. These composite bricks can further be used in the civil construction which can be useful in providing the extra strength to it.

Table 1. Mechanical Properties of Composite Used

Name of Composite	Density (kg/m^3)	Young's Modulus (Pa)	Poisson's Ratio (Pa)	Bulk Modulus (Pa)	Shear Modulus (Pa)
Concrete	2300	3E+10	0.18	1.5625E+10	1.2712E+10
Epoxy_resin	1160	3.78e+009	0.35	4.2e+009	1.4e+009
Resin_polyster	1.2E-09	3E+06	0.316	2.7174E+09	1.1398E+06
PVC Foam	8E-11	1.02E+05	0.3	8.5E+07	3.9231E+04

II. DESIGNING

The designing of the brick is done in Catia V5 taking the brick dimension as 100mm*200mm*100mm.

III. NUMERICAL STUDY

The filed designed in catia V5 is saved in .igs format. The file is then imported in the ANSYS 16.2 (Student Version). For the study of total deformation the STATIC STRUCTURE analysis is used in ANSYS 16.2 (Student Version). The meshing of the brick was done in ANSYS STATIC STRUCTURE 16.2 (Student Version). For dense meshing of the brick, as it help in the precise result calculation, the element size were kept 3E-03. Numbers of elements formed were 28081 and numbers of nodes formed were 45860.

Different composite were chosen from the material library of pre build in the software. The uniformly Distributed Load of 150KN is applied on the top and fixed support is given at the bottom of the surface. Then the results were calculated. The average simulation time taken by the system is around 240 to 300 sec.

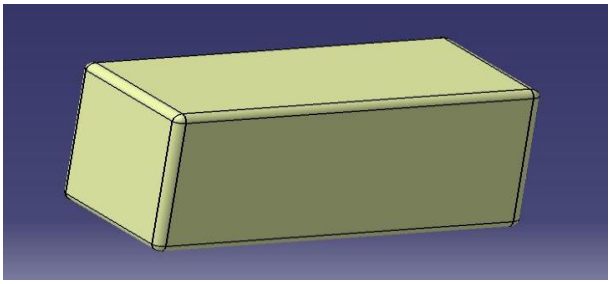

Fig.1 : Design of brick in CATIA V5

IV. RESULTS AND DISCUSSIONS

The simulation was done and results were calculated in ANSYS STATIC STRUCTURAL 16.2 (Student Version) by taking 150KN force on the top. Here we have considered 150KN because below this value at around 144KN the standard brick which are generally used now a day's start breaking and up to 150 KN it breaks. We have seen in our numerical solution that the brick which are made of composite deform very slightly even when 150KN uniformly distributed load is applied to it.

It clearly means the composite brick has more mechanical strength as compared to the general brick.

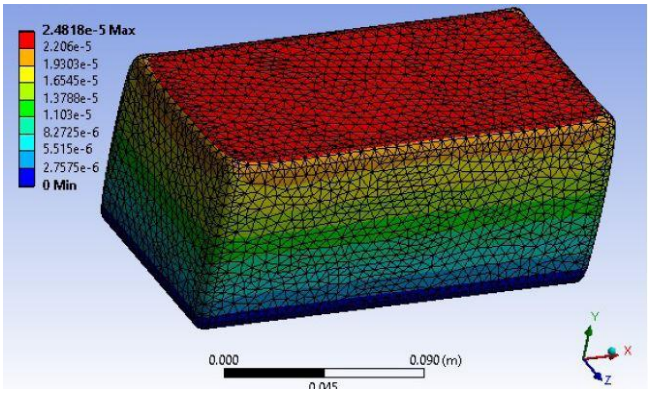

Fig.2 : Total Deformation in Concrete Brick

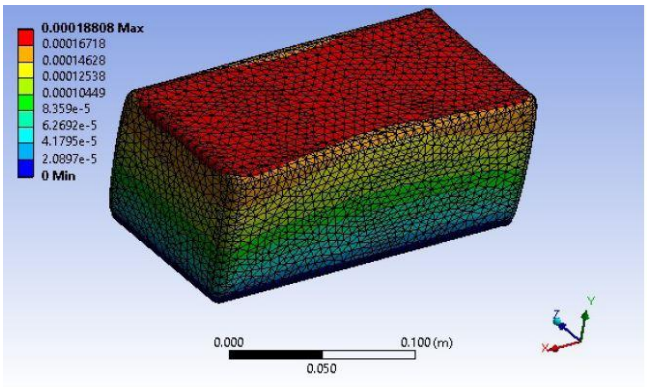

Fig. 3: Total Deformation in Epoxy_Resin

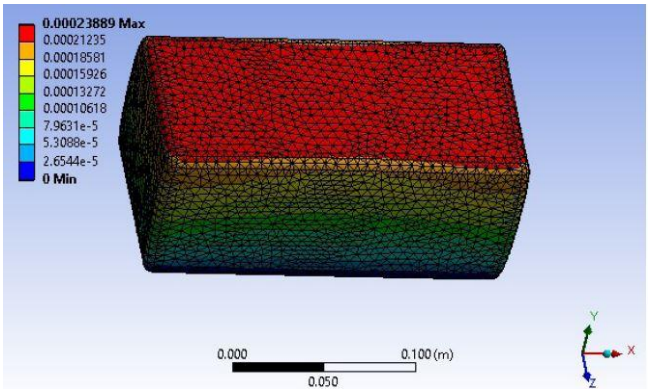

Fig.4 : Total deformation in Resin_Polyster

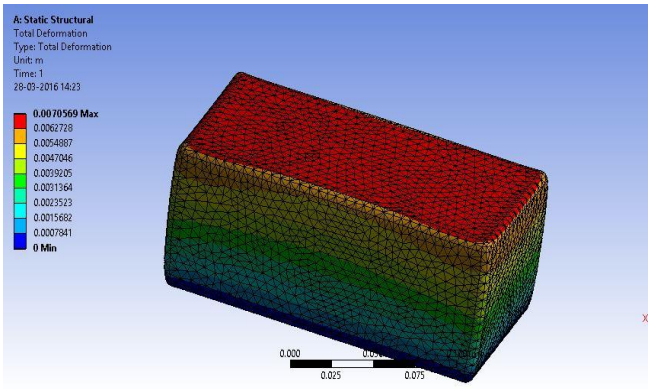

Fig.5: Total deformation in PVC Foam

V. CONCLUSION

This study performed to check the total deformation occurs in different composite bricks. The numerical simulation was performed using ANSYS STATIC STRUCTURAL 16.2(student Version). The total deformation contour of bricks was formed. This study gives the following conclusion that the least deformation occurs in is concrete and the maximum deformation occur it the PVC Foam that are 2.1848E-05m and 0.0070569m respectively.

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