

Study on Behaviour of CFT Replacing Plate Stiffeners with Shear Studs

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Abstract: *In this paper, we study about the behavior of CFT. The CFT are very much effective in the load carrying. As the modulus of elasticity of steel is more, when compared to the concrete, and when both act as one known as Composite Section. In this study we will be covering CFT under three different conditions, firstly CFT having axial and shear force in fin plate that is welded to the Column Plate. Second will be CFT having axial and shear force to the fin plate also having Shear studs at the centre of the Column plate. The third condition will be the longitudinal plate stiffeners welded to the column plate having axial and shear force to the fin plate welded to it. The stress and displacement developed in the column plate for the following above given three conditions are modeled and analyzed using the Software called Solid works. The results for three conditions of the CFT are compared. When the results compared among the three conditions, it clearly comes to know that the CFT having no stiffeners is least effective in load carrying, as the stress and displacement developed are very high. CFT having shear studs welded to the column plate have a intermediate stress and displacement. CFT having longitudinal stiffeners have very least stress and displacement. Hence, it is proved that the CFT having longitudinal stiffener plate welded to its inner face are more effective and impressive in carrying more loads with less Stress and displacement induced in it.*

Keywords: CFT, Stiffeners, Shear Studs, Longitudinal Stiffeners, Stress, Displacement

I. INTRODUCTION

The construction industries have magnificently developed themselves with their modern techniques. The very rapidly growing composite construction is becoming a well satisfied construction method for the upcoming industries. The CFT is known as the important part of a composite construction. CFT is majorly in rectangular and circular in shape. Many industries are developing their advanced techniques to improve the load bearing capacity of the CFT. The Strength of the CFT is analyzed and designed in various different ways around the globe. The specially used stiffeners are very effective for the increase of the CFT. The stiffeners play a very major role in the CFT, may it be shear studs, plate stiffeners, longitudinal stiffeners. Firstly, CFT was introduced in the bridges and slowly they were started by the commercial building, skyscrapers, and by many large structures. The shear studs allow the welding process to the column plate very easy and efficient. The shear studs should be designed and of which size it should be welded and how it should be oriented to the column plate. The longitudinal stiffeners also make a major difference in the local buckling of the column plates. The impetus of this study is to investigate the behavior of the CFT plate under conditions like CFT welded with the longitudinal stiffeners, CFT welded with the Shear studs, and to understand the behavior of the plain CFT plate. The model is developed and analyzed by using the solid work software. That is very much friendly to understand the Stress and the Displacements behavior in the CFT. The comparative study is done for the above said three conditions and the behavior is compared by the output results of the analyzed model for the Stress and displacements.

II. OBJECTIVES

The main objective of this study is to understand the behavior of CFT under various stiffened conditions inside the columns. To have the comparative study between the two types of stiffeners, shear studs and longitudinal stiffeners. To find the effective and efficient stiffeners that shall be used for the CFT having less stresses and displacement.

III. MODELLING

The CFT column plate is modeled and analyzed for the stress and displacement using the 3D modeling software Solid works. It was developed by the Dassault Systemes. It uses the principle of parametric design and generates three kinds of interconnected files. The software is used for design and building of any type of elements. The Single side CFT plate is modeled and analyzed with fin plate welded at its centre axis. Also having two different types of stiffeners welded on the inner face of the CFT column plate. The modeled element diagrams are shown below.

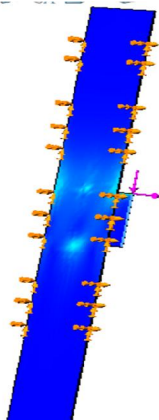


Figure 1: CFT with no Stiffeners

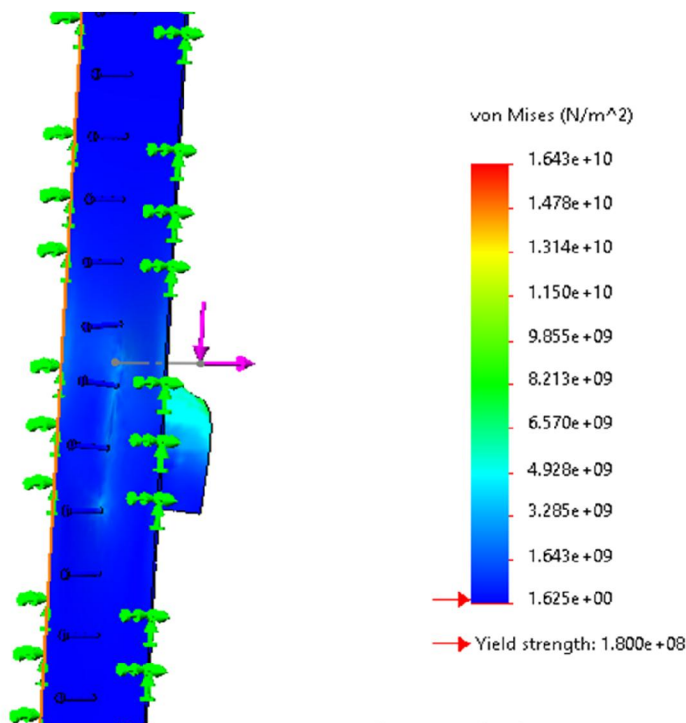


Figure 2: CFT with shear studs

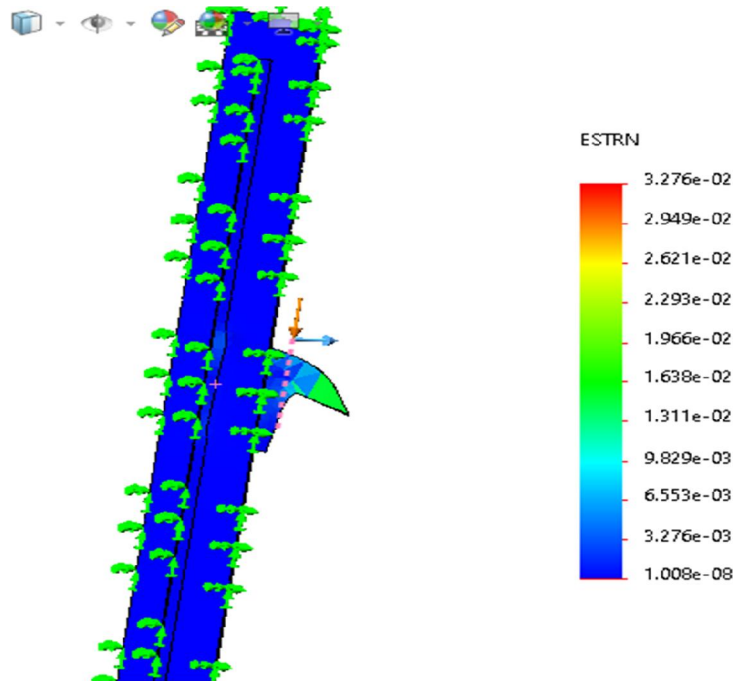


Figure 3: CFT with longitudinal stiffeners

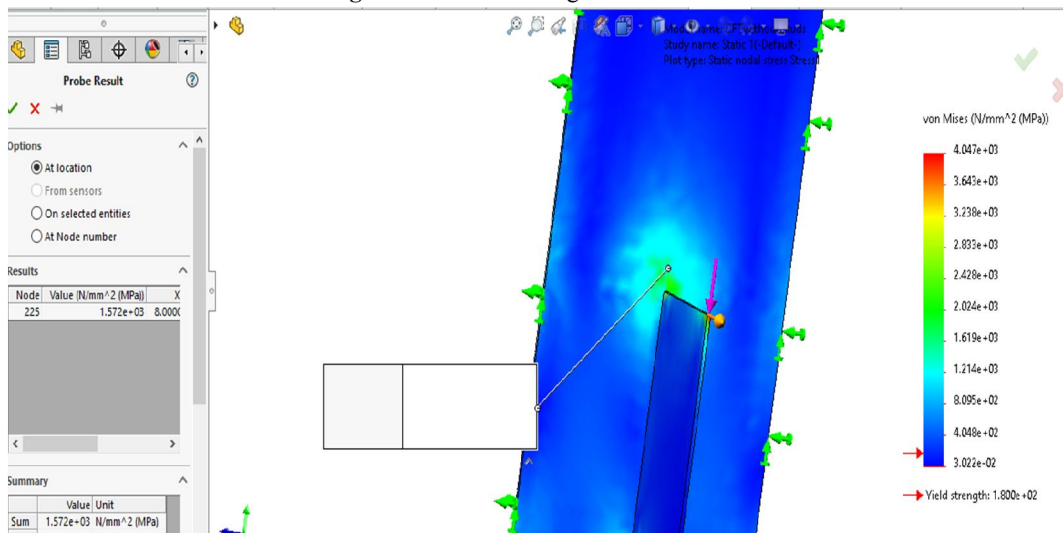


Figure 4: Column plate point for which stress and displacement where noted for all CFT column plate

IV. SUMMARY TABLE

CONDITIONS OF CFT	STRESS (N/mm ²) @ Column Plate.	DISPLACEMENT (mm) @ Column Plate.
CFT without Studs	1572	14.45
CFT With Studs	880	3.51
CFT with Longitudinal Stiffeners	312	0.115

Table 1

V. CONCLUSION

- Hence by the study done, the behavior of the CFT is understood under various conditions.
- The Comparative study is also done between the Shear Stud Stiffeners and the Longitudinal Stiffeners.
- The concluding result shows that the CFT having longitudinal stiffeners are much more effective and has less stress and displacement.
- The CFT having no stiffeners in it, are not very effective and efficient when compared to the CFT with shear studs and longitudinal stiffeners.

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