

Study of Business House with two Different Materials Considering Framework Gantry using Staad.pro

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ABSTRACT

In industrial structures trusses are assembled using bolted, riveted and welded joints as per load distribution. In India general steel structure which we use is FE 345 grade, which is heavy, and rigid to bear machinery load. These structures are comparatively much costlier than RCC structures. For their assembling cranks are required to fix at the specific position as manually they are not possible to lift. These structures has to bear machinery loads and live load of workers.

In our study we are performing analysis of such structure considering material other that General steel (hot rolled). In this study we are analyzing the same structure with same loading conditions using Cold formed steel structure. In this study we are comparing both the structures for lateral pressure using analysis tool Staad.pro which is advance analysis tool with optimization option for cost effective design.

Comparative analysis was done while creating a structure using Hot rolled Steel sections and Cold Formed Steel (CFS) and results were presented on Shear Force, Axial Force, Support Reaction, Node Deflection and Cost analysis where Cold formed Steel was found durable in every case.

KEYWORDS: Cold Formed Steel, Staad.Pro, Gantry Cranes, Hot Rolled Steel and Cost Analysis

INTRODUCTION

Industrial structures are built up of steel structures for easy assembling as per industrial requirement and for generating desired strength. In industrial structures trusses are assembled using bolted, riveted and welded joints as per load distribution. In India general steel structure which we use is FE 345 grade, which is heavy, and rigid to bear machinery load. These structures are comparatively much costlier than RCC structures. For their assembling cranks are required to fix at the specific position as manually they are not possible to lift. These structures has to bear machinery loads and live load of workers. As per site specifications it is specified that industrial building will be away from residential area to avoid pollution generated from these industries, thus there are specific regions decided by the government to built industries and factories. As in Bhopal region two specific areas has been decided they are mandideep and pillu khedi, where bulk of industries are working.

As these areas are open impact of wind pressure is high which has to resist in designing to provide safety and strength to the structure. These structures are generally open structures where upper shed for roof is provided. As Bhopal region is specified with basic wind speed of 39 m/s as per I.S. 875-I: 2015 these structures are required to design to resist pressure generated for this region.

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Literature Review-

Moushtakim Billah et al (2019) this research paper represented description of cold formed steel by presenting its behavior, properties of the material, various method of production and classification of cold formed steel elements. This even presented the guidelines and the codes which needs to be followed for cold formed steel structures, importance of its design criteria, connecting membranes and issues related to its durability.

The favourable properties of cold-formed steel for structural application are developing its prevalence quickly throughout the world. Alongside these points of advantages, there are a few properties which influence the structural execution of cold-shaped steel. The thickness of areas, framing procedure and complex structure design make difficulties for engineers to guarantee appropriate plan and development of cold-shaped steel structure. This examination has checked on the

history, material properties, codes and determinations accessible, a basic plan thought, consumption and fire security and research improvements of cold-shaped steel structures. New Researches on cold-formed steel urged to beat the difficult circumstance, improve its exhibition and change the codes and rule. These examinations are making the specialist and planners certain to utilize cold-shaped steel to improve the exhibition of a structure.

Sureshbabu S and SenthilSelvan S (2019) this research paper presented the experimental investigation on flexural behavior of Cold formed Steel (CFS) members lipped channel corrugated sections considering three different sets of corrugated sections which were undertaken for examining flexural behavior such as Firstly, horizontal corrugated back to back lipped channel sections

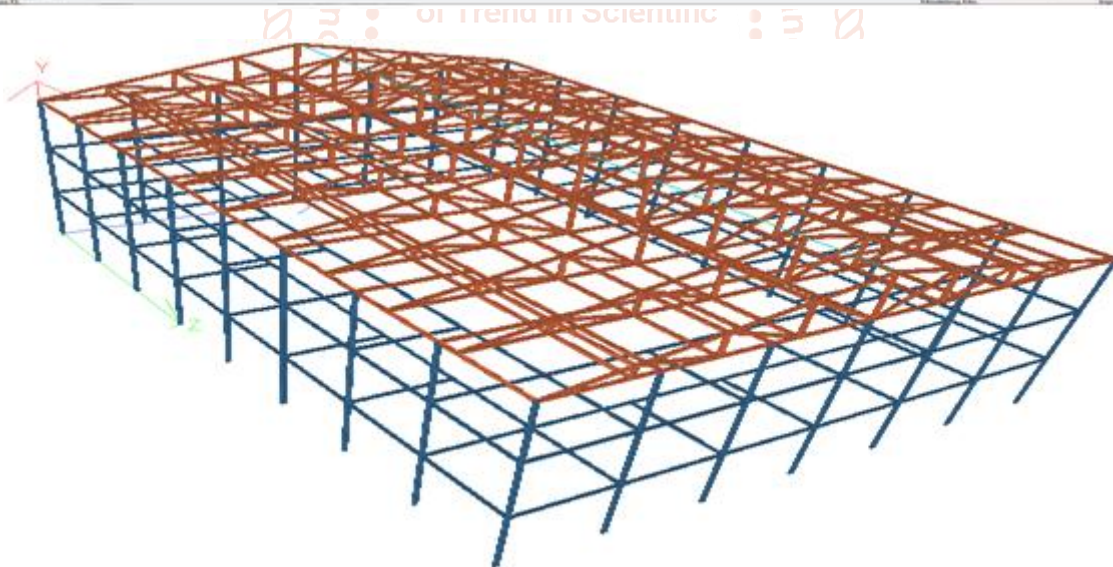
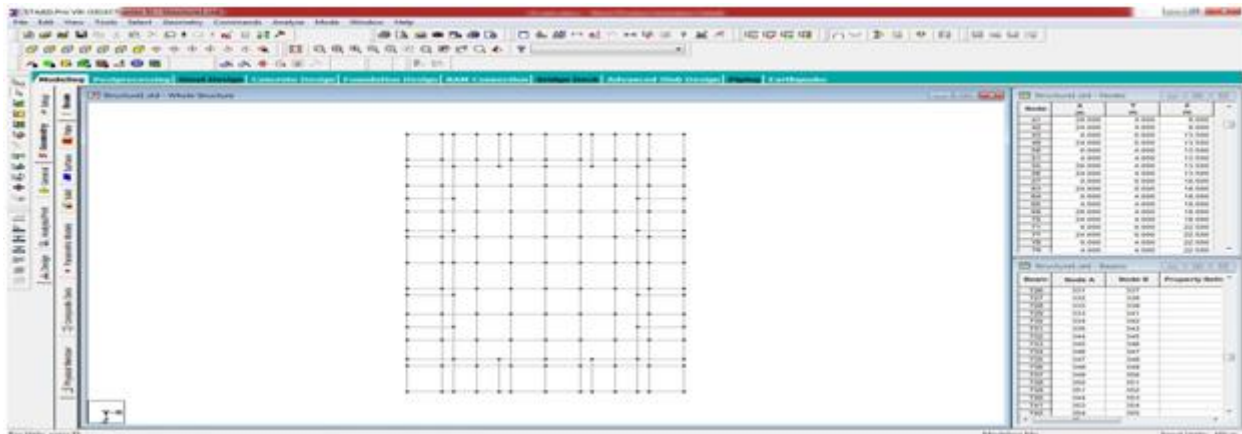
METHODOLOGY

General

The main motive of this dissertation work is to justify the use of C.F.S material as a replacement of hot rolled steel in industrial structures and to justify the structure stability under wind pressure.

In this study, we are performing Analysis of a mid rise industrial structure with gantry crane assigned using analysis tool STaad.pro

- Steps assigned for progress of the work are as follows:
 Step-1: Selection of structural geometry as per requirements of industrial building;
 Step-2: Structure with C.F.S and Structure with Hot Rolled steel:



Conclusion

As in this study we have presented comparative analysis of an industrial building with gantry crane load at the mid of the structure using analysis tool Staad pro, where we have utilized hot rolled steel structure and cold formed steel structure to determine the utilization of cold formed steel structure for small industries, here following points which we have observed are concluded as follows:

Shear force: Shear Force is the unbalance forces generated due to weak distribution of compression and tension load over the truss structure. Here it is observed that cold formed steel structure is resisting unbalance forces more accurately as compared to hot rolled structure.

Axial force: Axial forces are the vertical pressure generated due to distribution of pressure in vertical members; hot rolled steel structure is observing more forces in comparison which results in instability of the structure.

Support reactions: Support reaction at the bottom shows the forces which are to be distributed to the soil beneath. As observed in chapter above it can be state that C.F.S structure are light weighted structures which results in less dead load in comparison.

Node Deflection: Node deflection due to connection of different members results in weak spring which is observed more in hot rolled structure due to heavy sections.

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