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Analysis of Commercial Building with Two Different Materials Considering Framework Gantry Load Using Software

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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 his or her assembling cranks are required to repair at the precise position as manually they're impossible to lift. These structures have got to bear machinery loads and super 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 analysing 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. Research work and tried to look at different properties of concrete like compressive quality, split rigidity, and flexural quality.

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

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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.

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.

Truss arrangements

Trusses are formed by assembling members in a pattern to distribute tension and compression.

Truss arrangements have different distribution pattern and connections, they have pinned and roller supports which helps to release bending and restrain forces in vertical and horizontal directions. Truss structures are utilized in areas where high strength is required, there are number of arrangements which are generally in use are howe type, pratt type, N-type, warren type, king post truss etc.

LITERATURE REVIEW

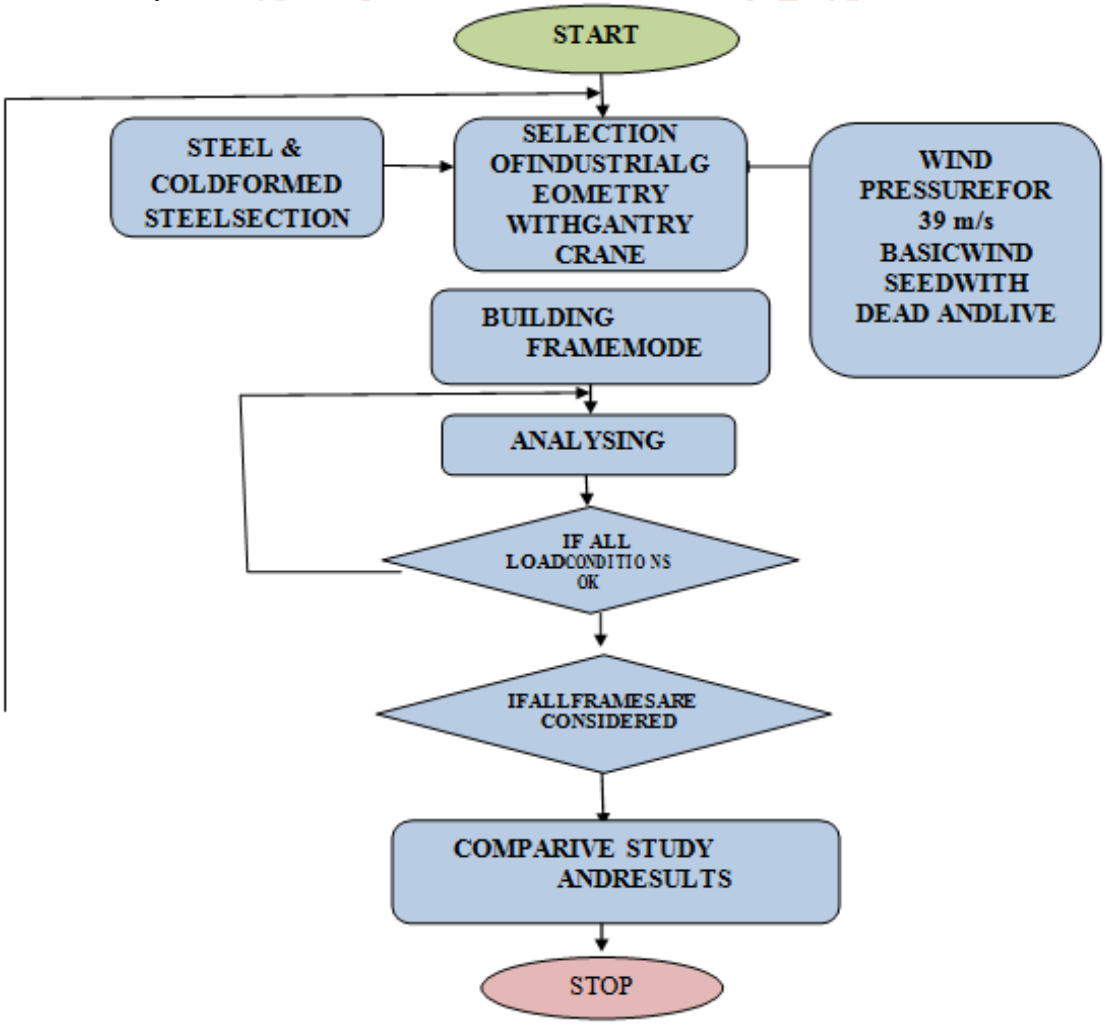
Moushtakim Billah et al (2019) this research paper represented description of cold formed steel by presenting its behavior, properties of the material, various method of production and classification of cold formed steel elements. This even presented the guidelines and the codes which needs to be followed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

Flow Chart of the Study



PROBLEM FORMULATION

Geometrical details

Geometrical details	
Type of roof truss	**Howe roof**
Section Size	As per Indian Steel Table
Support Condition	Pinned support and Fixed support
Length	36 meter
Bays in Z direction	8 bays
Width	24 meter
Bays in X direction	6 bays
Vertical height	12 m

Material Properties

Material properties	Values
Density of STEEL	7480 kG/ m^3
Density of Cold Formed Steel	8000 kG/ m^3
Young's modulus of STEEL	2.17 x 10^4 N/mm^2
Poisson ratio, μ (Steel)	0.17
Poisson ratio, μ (C.F.S)	0.3
Tensile strength of Steel	415 N/mm^2
Elastic Modulus of C.F.S.	3447.3 MPa
Tensile Strength of C.F.S.	550 N/mm^2

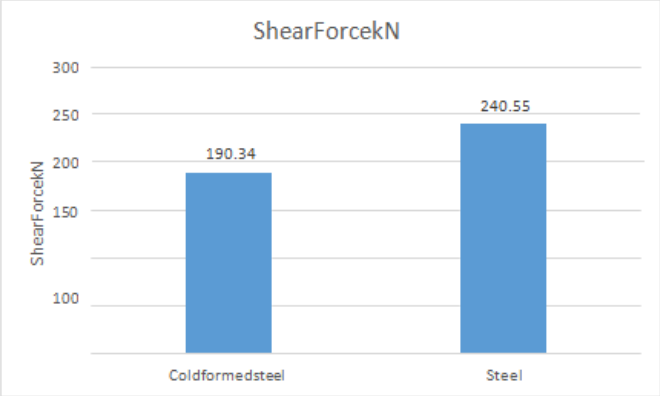
RESULT ANALYSIS

Analysis of Maximum Forces

Maximum Shear Force:

Shear Force

Maximum shear force KN	
Cold formed steel	**Steel**
190.34	240.55



Maximum Shear Force KN

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