A STUDY ON DESIGN OF INDUSTRIAL BUILDING-A REVIEW

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Abstract:
Structural Steel is a common building material used throughout the construction industry. Its primary purpose is to form a skeleton for the structure, essentially the part of the structure that holds everything up and together. Steel is one of the friendliest environmental materials which is 100% recyclable. Structural design has evolved, mostly due to the necessity caused by earthquakes. By using the available ISMB steel sections the desired design requirements cannot be met, especially for the highly loaded structures, as the moment of inertia and cross sectional play major role. Reinforced concrete sections also carry the ultimate load but when the assembly is subjected to great height of about 50-60 meters it is unsuitable for the use of concreting processes, thus by using the fabricated structure it is easy to fabricate durable structure. However, like all innovations, technology breeds its own set of new problems. So by the use of STAAD-Pro, seismic analysis is easily carried out with adequacy.

Keywords: STAAD PRO, Code book.

Introduction:
The concept of Pre Engineered buildings (PEB’S) originated in the USA during the times of the two world wars. The need for portable shelters that can be set up on a very short time and can be dismantled and re-used at different locations rose very much especially for the armed forces who were always on the move. What begun as small shelters was later developed as separate types of buildings which were referred to as Pre-Engineered buildings.

Now a days many industrial buildings are Pre-Engineered Buildings (P.E.B). These buildings are easy to erect and have proved to be efficient in terms of durability and strength. Thus, it is no surprise that many industrial buildings that once relied on conventional methods of construction have begun to chance their buildings to PEB structures.

Literature review:
1. Ms. Aayillia. K. Jayasidhan tells that the design and analysis of multi storeyed industrial building. It is a Basement+Ground+3 storied building, located at Koratty. The analysis and designing was done according to the standard specification to the possible extend. The analysis of structure was done using the software package STAAD PRO.V8i. All the structural components were designed manually. The detailing of reinforcement was done in AutoCAD 2013. The use of the software offers saving in time. It takes value on safer side than manual work.

2. Swapnil D. Bokade, Laxmikant Vairagade explains about two types of industrial buildings. The two buildings are Conventional and pre-engineering building Pre-Engineered Building (PEB) concept is a new conception of single storey industrial building construction. This methodology is versatile not only due to its quality pre-designing and prefabrication, but also due to its light weight and economical construction. The concept includes the technique of providing the best possible section according to the optimum requirement. This concept has many advantages over the Conventional Steel Building (CSB) concept of buildings with roof truss.

3. Aijaz Ahmad Zende, Prof. A.V. Kulkarni, Aslam Hutagi tells about the comparative study of static and dynamic analysis and design of Pre Engineered Buildings (PEB) and Conventional steel frames. Design of the structure is being done in Staad Pro software and the same is then compared with conventional type, in terms of weight which in turn reduces the cost.

4. C. M. Meera tells about the comparative study of PEB concept and CSB concept. The study is achieved by designing a typical frame of a proposed Industrial Warehouse building using both the concepts and analyzing the designed frames using the structural analysis and design software Staad.Pro.

5. Yash Patel, Yashveersinh Chhasatia, Shreepalsinh Gohil, Het Parmar tells that the steel building are made up with orthodox sections of steels which are designed and built by conventional approaches. This directs to weighty or too expensive structures. Tubular steel is the best possible alternatives to the conventional with their comparatively better specifications. Dead weight is tending to be decreased for many structural members so it is clear that because of the tube section, it helps in reducing overall economy. This is regarding the economy, load carrying capacity of all members and their relative safety measures. Economy is the main goal of the present work including comparison of conventional structures with tubular structure for given conditions. Results show that up to 15 to 25% saving in expense is accomplished by using tubular sections. Analysis of shed’s elements was carried out by Staad Pro V8i computer software, with manually applying Indian Standards. Several excel sheets for various structural elements like Purlin, Roof Truss, compression member, Tension member etc. were carried out using Microsoft office excel. Lastly estimation sheet is prepared for each
Conventional Roof Truss section as well as Tubular roof truss section.

6. Sagar.D involves In this paper Industrial Steel truss Building of 14m x 31.50m, 20m x 50m, 28m x 70m and bay spacing of 5.25m, 6.25m and 7m respectively having column height of 6m is compared with Pre-engineering Buildings of same dimension. Design is based on IS 800-2007 (LSM) Load considered in modeling are Dead load, Live Load, Wind load along with the combinations as specified in IS. Analysis results are observed for column base as hinge base. Results of Industrial steel truss buildings are compared with the same dimensions of Pre-Engineering Building.

7. Pradip S. Lande, Vivek, V. Kucheriya This paper study of various papers published related to comparative study of conventional and pre-engineered building. The main objective of this literature is to explore related studies of analysis and design of conventional steel building and pre-engineered building and study of economic aspects of cold formed steel over hot rolled steel for purlins.

8. Laxmi R. Gupta, Samruddhi S. Thawari author tells that the Steel is a common building material used throughout the construction industry. Its primary purpose is to form a skeleton for the structure, essentially the part of the structure that holds everything up and together. Steel is one of the friendliest environmental materials which is 100% recyclable. Structural design has evolved, mostly due to the necessity caused by earthquakes. By using the available ISMB steel sections the desired design requirements cannot be met, especially for the highly loaded structures, as the moment of inertia and cross sectional play major role. Reinforced concrete sections also carry the ultimate load but when the assembly is subjected to great height of about 50-60 meters it is unsuitable for the use of concreting processes, thus by using the fabricated structure it is easy to fabricate durable structure. However, like all innovations, technology breeds its own set of new problems. So by the use of STAAD-Pro, seismic analysis is easily carried out with adequacy.

9. Darshan Kalantri, Sujay Deshpande, Pavan Gudi author tells that the Pre-engineered Building (PEB) design of structures has helped in optimized design. The adoption of PEB design concept in place of Conventional Steel Building (CSB) design concept resulted in many advantages as the members are designed as per bending moment diagram thereby reducing the material requirement. This methodology is versatile not only due to its quality predesigning and prefabrication, but also due to its light weight and economical construction. This concept has many advantages over the CSB concept involving buildings with roof trusses.

10. A. SRAVAN KUMAR, SANJEEV RAO, MADAN MOHAN, DR. SREENATHA REDDY deals with the concept of steel structures introduce in early 1960’s the structure here uses entire I sections and the beauty here in this concept is no welding process will be carried out in site entire structure will be Designed and manufactured
in shop and this will be brought to sit and assembles, the entire sectional properties will depends just upon the moments at that specific locations so there won’t be any excess steel used in the thus it is economical. Here I am designing such a PEB building by selecting a real time project consisting a 69m wide and 173m length textile building by IS 800-2007 Design code using STAAD Pro and explaining its each and every parameters and design and detailing.

Conclusion:

The calculations of various loads acting onto the structure was done using Indian code provisions. Then, load combinations were developed and the foundation design was done based on the loads acting the base of the structure. The design of the hanger was done and analysis of the structure was carried out using both manually and STAAD.PRO software. The results shown similarities in the design of the hanger. The deflection values by both methods were found to be less than the calculated allowable deflection. Thus, the structure is safe against deflection.

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