

Seismic Evaluation of Pre-Engineering Building & Conventional Steel Building

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Abstract: The industrial building can be categorized as PEB and CSB. According to this design concept presently, huge column space is utmost demand for kind of trade and with advent of software's it is easily possible now. However, with improvement in the technology the software in computer has contribute immense in enhancement of quality life through new research. PEB fulfils each and every requirement which the CSB do not fulfil. Concept of PEB is reduce quality excessive steel as per internal stress distribution of frame.

The weight of PEB depends on bay spacing and in analysis most suitable bay spacing in terms of cost. Thus, in PEB total the total design is done in factory and as per design members are prefabricated and transport to site they erect the building in time less than six to eight weeks.

In PEB concept complete design is done at factory and building components are taken to site in completely knock down condition (CKD).

The adoptability of PEB in place of CSB. The steel industry is rapidly increasing input of world. To meet its rising demand some alternative way construction is incorporate.

INTRODUCTION

PEB:

They are nothing but they are steel buildings in which excess amount of steel is avoided by the most famous tapered sections as per the bending moment's requirement.

The principle of the PEB is known as most flexible and economical building. In construction industries the speed of delivery, economy and installation is unparalleled, no other building system matches PEB in terms of speed and cost.

The PEB building structure over CSB in the detail by consider cost, time, and the requirement of material.

The design aspects of American Standards is lower as compared to Indian Standard and mentioned main criteria as list below and has caused weight of structure to more when

designed using IS 800-2007 when compared to MBMA/AISC design code.

The PEB are the portal frame construction. It comprises of the secondary and the primary framing and the bracing system. A set of three element and weather covering sheeting result in the stable steel buildings instead of the individual frame. In the Structural Engineering the PEB is designed by the PEB supplier on the PEB manufacturer with the single design to fabricated using the various material and various method to satisfy a wide range of the structural and the aesthetic design requirements. The main thing what makes them different from another building is that the contractor also designs the buildings- a practice called design and build. This style of the construction is ideally suited to the industrial building and the warehouses. Sometime this structure are called as 'Metal boxes' or 'Tin sheds'. They are also called as the PEMB that is Pre-Engineered Metal Buildings. Due to the reduction of the design time in PEB the buildings are made quickly and efficiently.

Conventional Building:

The CSB are the low-rise sleet structures with having the roof systems of truss with roof covering. There are so many types of roof trusses which can be used for this steel structures depending upon the pitch of the truss.

In today's world, the steel is bringing the elegance, artistry and it is also functioning in the endless way to contribute for the new solution of the construction. The steel also on the other hand offer the speedy construction from the start. Due to the important characteristics like, ductability, flexibility, etc. the steel is widely used in the construction industries.

If it is seen that the steel has some strength in them then the CSB are stable. The hot rolled structural members are used in the steel construction. Hence the members are fabricated in the factories or in the industries and then after the fabrication they are transported to the

site. In this method the mill- produced hot rolled sections (beams and columns) are used.

The size of each member is selected on the basis of the maximum internal stress in the members. Since a hot rolled section have a constant depth, many parts of the members in the areas of low internal stresses are in excess of the design requirements.

Advantages of PEB system

1. It Take less time as CSB construction time
2. Overall cost is lower
3. Lighter foundation
4. Having Flexibility of expansion
5. Large clear spans
6. Quality control
7. Low maintenance
8. Energy efficient roof and wall system
9. Architectural versatility
10. Single source responsibility

Disadvantages of PEB system

1. Susceptible to commotion
2. Low thermal resistivity
3. Low fire resistance
- 4.

Advantages of Conventional Steel Building

1. It supports beam and concrete slab
2. CSB masonry from bricks and plaster
3. It is classic method of construction
4. It is most popular in the area of Greece
5. Sometime It is cheaper than other systems
6. The workers can be trained easily to erect moulds and set steel reinforcement

Disadvantages of Conventional Steel Building

1. There are longer time of delivery in CSB
2. It Requires more cost of social security contribution
3. It is more expensive building method then PEB
4. Required high cost for repair of damage.
5. Required more time for completion.

LITERATURE RIVEW

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Paper 2- Ms. Darshana P. Zoad International Journal of Engineering Research & Technology (IJERT)

Paper 3- Gursharan Singh, Introduction to Pre Engineered Buildings, 2008.

From study of above researches, I conclude that-

- Design of industrial building having large clear span PEB is more economical
- This conveys that PEB structures can be designed easily by simple design method.
- The low weight of an PEB building and the flexible frames offer it higher resistance to the loads of earthquake.

SCOPE OF STUDY

1. Now a days in construction industry, the project is implemented on fast track basis.
2. For fast track based project its is very important to material selection.
3. Steel provides flexibility, ductility, strength, etc. that why
4. For steel structure design, designer can go for PEB and CSB.

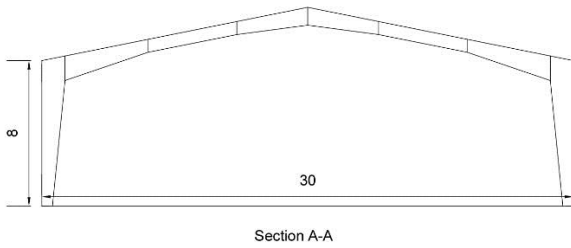
METHODOLGY

Steps to Design A Model

1. Wind Load Calculation
2. Purlins Design
3. Girt Design
4. Design of Main Frame
5. Base Plate
6. Anchor Bolt Design for Moment Condition
7. Anchor Bolt Design for Shear Condition
8. Gable Column Design
9. Design of Connection Plate
10. Cranes Design

Data Opted for Model

- Height- 8m
- Total Width- 30m
- Total Length- 60m
- Single bay length- 6m

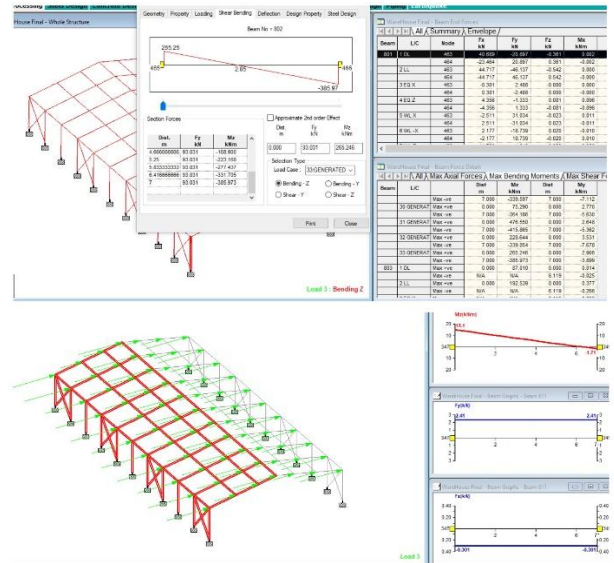


Section A-A

Fig 1- Section of model

Table: Forces on PEB & CSB

	PEB	CSB
Axial Force	164KN	198.65KN
Axial Force at Mid	152.076KN	182.28KN
Axial Force at End	95.791KN	118.35KN
Shear Force	93.031KN	129.335KNM
Shear Force at Mid	118.615KN	133.59KNM
Shear Force at End	81.1KN	119.26KN
Bending Moment	265.246KNM	195.36KNM
Bending Moment at Mid	338 KNM	228.84KNM
Bending Moment atEnd	228.644 KNM	184.79KNM



Discussion:

- Deflection in PEB at start support is 2.93mm while in CSB is 9.6 mm
- At mid support PEB having 5.78mm deflection but in CSB there is 12.4mm
- At end support PEB having 7mm less deflection then CSB (10mm)

Quantity of Steel Utilized for the Structure

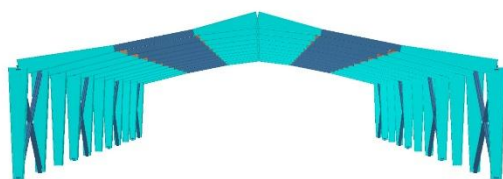
CSB With Steel Column	134.5 Tonnes
PEB	106 Tonnes

CONCLUSION

- Reason of PEB to not be economical option in case of end from is due to of a greater number of columns between main columns.
- After its introduction the concept of PEB, design help in optimizing material involve in design.
- Reaction at supports in PEB is less then CSB
- After all Pre-engineering Building is cheaper as conventional steel structure

REFERENCES

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