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Comparative Study of Pre-Engineered Steel and Conventional Steel for Industrial Building

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ABSTRACT: Pre-Engineered Building (PEB) concept introduction in structural design in recent years has aided in design optimization. Pre Engineered Buildings (PEB) meet this criterion with less time and expense as compared to traditional buildings, and long span, column free structures are the most important in any form of industrial structures. This method's versatility is a result of its excellent predesigning and prefabrication in addition to its lightweight and affordable construction. Pre Engineered Buildings (PEB) and t Conventional steel frames with concrete columns and steel columns are compared in the current work.

KEYWORDS: Pre-Engineered Building, Conventional steel Building, Industrial Building, Economical.

I. Introduction

The construction sector in India, which ranks right after agriculture in terms of its economic contribution to the country, is largely responsible for the country's second-fastest economic growth in the globe. Pre-engineered Buildings (PEBs) is one of the concepts that the building industry has found, invented, and developed in the course of its unwavering development. PEBs are delivered to the site as a fully assembled finished product from a single provider rather than being constructed on-site. They include a basic structural steel framework with connected factory finished cladding and roofing components. The building's numerous components are bolted together in accordance with the plans to create the structure on the site. With the use of prospective design software, PEBs are created. Construction of conventional buildings has been completely transformed by the advent of technical innovation that allows for 3D modeling, detailing, and coordination of the planned structure. India's pre-engineered buildings (PEB) industry is its future. The majority of Indian businesspeople are only now beginning to understand the advantages of PEBs. It is challenging to make changes where concrete construction has been the norm for as long as anybody can remember. However, the most forward-thinking businesses in India are benefiting from PEBs.

What is Pre-engineered Steel Buildings?

Pre-engineered structures are manufactured in large part from steel, brought to the construction site, and bolted together. The roof, beams, and columns are finished by the stiff frame. Then, more external panels, structural components, and accessories are put together. Built-up sections, which Pre-engineered Buildings introduced in place of traditional hot-rolled sections, completely transformed the building industry. Compared to their traditional counterparts, PEBs stand out due to their larger column-free surface.



Fig No 1 Pre-Engineered Building (3D)

What is Conventional Steel Buildings?

Conventional structures, on the other hand, are classic structures made of steel, brick, and cement. These are constructed and put together on the spot. Cutting and welding are common construction techniques that are mostly carried out on construction sites. A typical building is created from the ground up, needing significant design input and detailed details work done by consultants



Fig No 2 Conventional steel Building.

II. .RESERCH METHDOLOGY

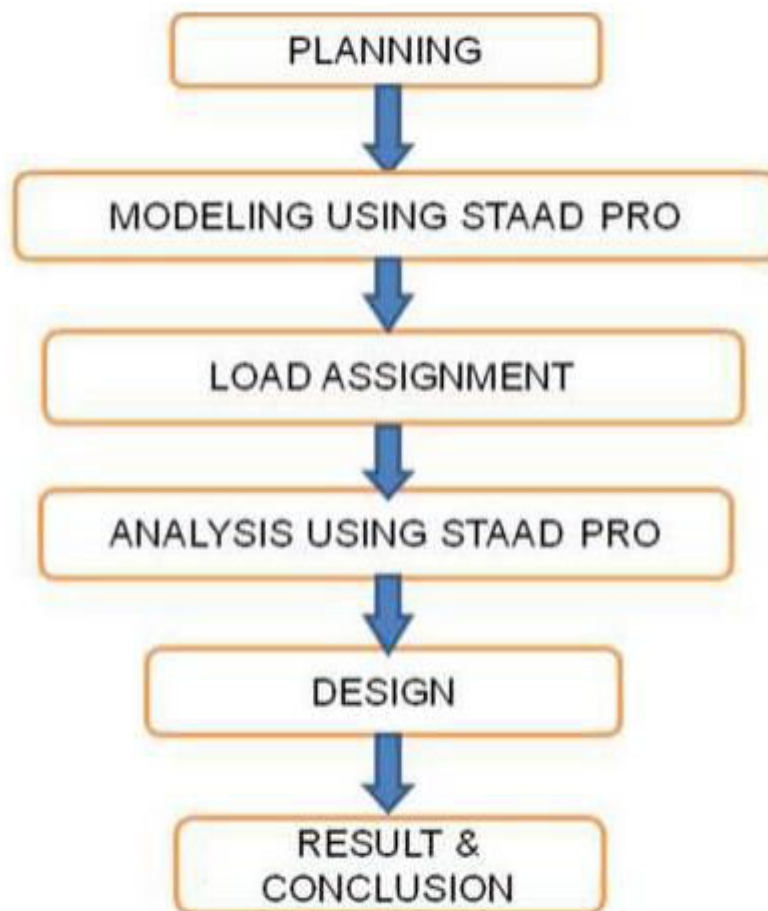


Fig No 4 Research Methodology Flow chart

III. STRUCTURAL PARAMETERS

- ❖ No. of Bays in X- Direction=8
- ❖ No. of Bays in Z- Direction=5
- ❖ Span of industrial shed =40m
 - ❖ Purlin distance=1.5m
- ❖ Height of Industrial shed structure at edge=8m
 - ❖ Support condition = Hinged
 - ❖ Total Area =20 x 40 M

III. GEOMETRY OF THE INDUSTRIAL BUILDING MODEL

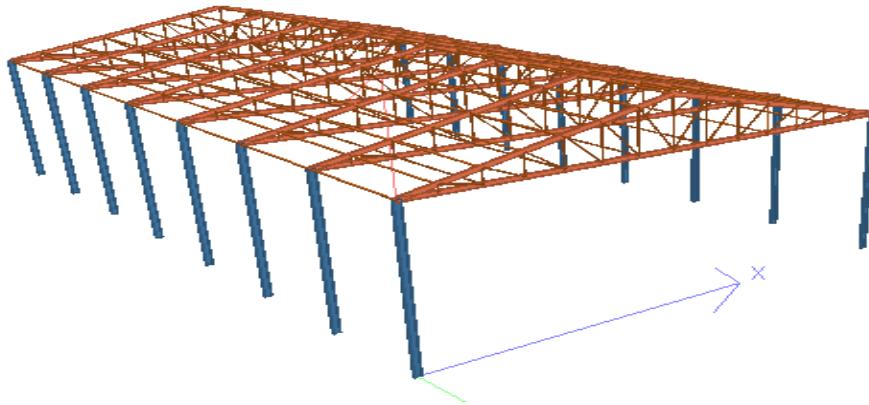


Fig No 4 Conventional steel Building (3D)

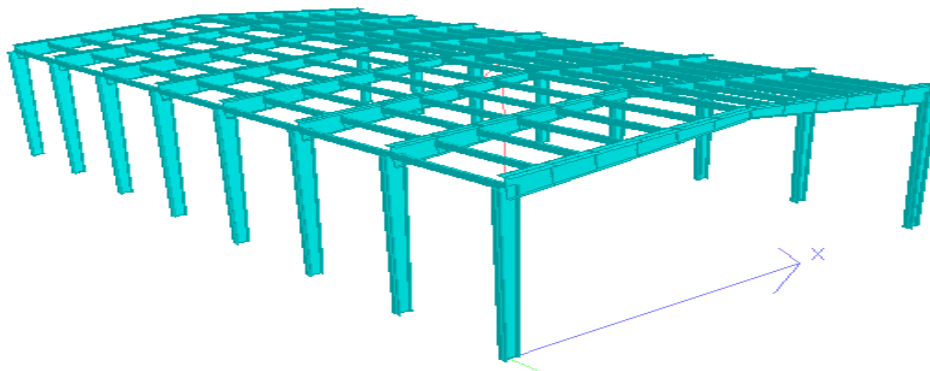


Fig No 5 Pre-Engineered Building (3D)

IV.WEIGHT COMPARISON

Weight Comparison (kg)	
Conventional steel Building	6663.43 kg.
Pre-Engineered Building	4531.13 kg.

Table-1 weight comparison

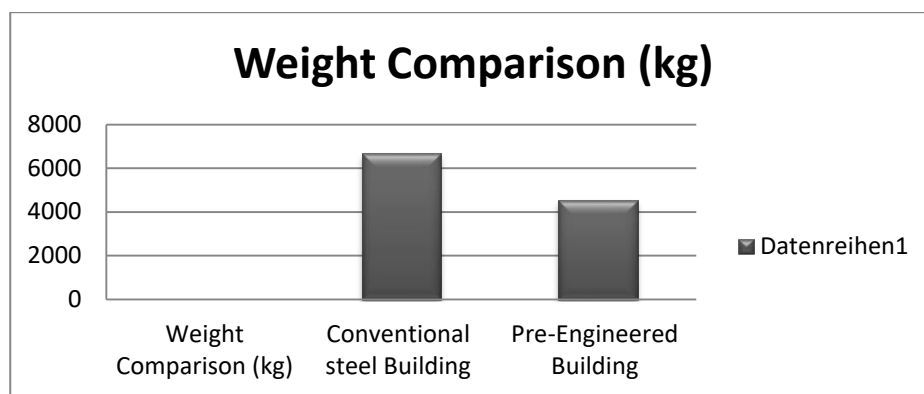


Fig No.6 Weight Comparison (kg)

V.CONCLUSION

- ❖ The study of Cost of Construction of the models showed that Pre-Engineered Buildings are economical since the effective sizes of the structural members in Pre-Engineered Buildings are lesser than Conventional steel Buildings. Hence, the quantity of steel required for Pre-Engineered Buildings will be lower than the Conventional steel Buildings. It was seen that there was about 20% saving in cost for CSF compared to Conventional steel Building.
- ❖ The study of Time of Construction of the models showed that Pre-Engineered Buildings can be constructed in a lesser time compared to the Conventional steel Buildings for the same geometry. On an average, the Pre-Engineered Buildings can be constructed in about 25% lesser time duration than Conventional steel Buildings.

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