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Pre Engineered Structure Study: A Review

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Abstract: ***The Pre-engineering Structure (PES) system is an advanced development in steel structure design that enables reasonably priced, environmentally friendly buildings. Pre-engineered Structure (PES) type steel constructions can be quickly and easily built. Pre-engineered buildings are essentially steel constructions with sections that have been tapered to account for bending moments in order to avoid using additional steel. Pre-Designed Structure (PES), which makes use of steel structures and enhances design by ensuring economic safety, is a modern concept. The main objectives of this essay are to reduce time and resource utilization and to understand PES concepts.***

Keywords: Pre-engineering Building and conventional steel structure.

I. INTRODUCTION

Construction of structures today is becoming more and more important. In today's culture, there are many various types of structures, including pre-engineered, RCCC, steel, and timber buildings. The comparison of PES and traditional structures is the main topic of this study. Structures known as pre-engineered structures (PES) are created in a factory and assembled on site. This kind of structural concept is frequently used while building industrial constructions like warehouses, metro stations, and other structures. Pre-engineered Structures (PESs) are the newest trend in India. A PES is a particular kind of metal building that has standing seam roof panels and light gauge wall coverings that span between strong supports to support them.

II. PRE ENGINEERED STRUCTURE

Pre-engineered steel buildings are produced or manufactured within the plant itself. Production of structural members is done in accordance with client requirements. The precise structural members are made particularly for their individual places and are numbered, which cannot be modified, because members are manufactured in line with design features. These components are created in a modular or completely knocked condition for transport. These parts are shipped to the client's location and installed there. There is no welding or cutting done at the customer's location. Production is not carried out for clients on-site.

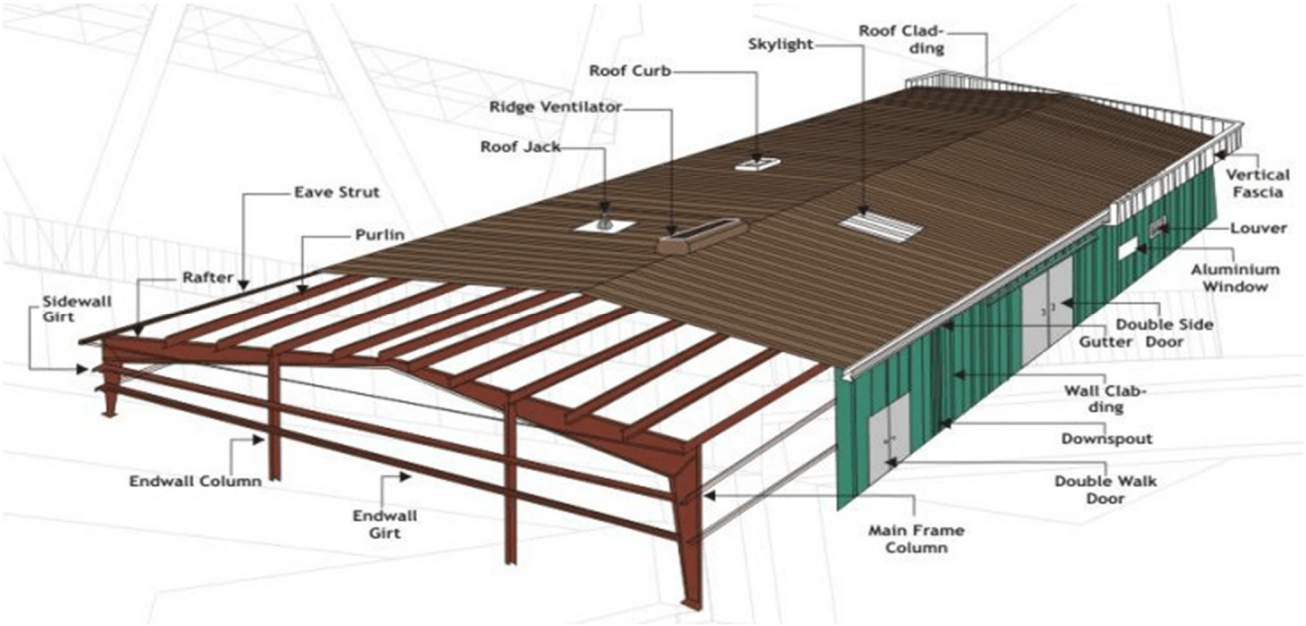

Figure 1 Pre-Engineered steel Structure

III. LITERATURE REVIEW

Numerous studies have been conducted on the PES frame system. After looking at those studies, it is clear that there are still many areas that require investigation. Here are some research report summaries:

Jinsha MS (2016)In this study, a pre-engineered building with a 25m width and a 6m eave height has been examined and designed using STAAD Pro.2007 in order to comprehend the behaviour of the pre-engineered structure and to ascertain whether it may reduce the quantity of steel needed by adjusting bay spacing as 6m, 8m, 10m, and 12m. Pre-engineered buildings meet the requirement for long Span, Column Free Structures, which is the most crucial in any kind of Industrial Structures and requires less time and money to build than traditional structures. Pre-engineered buildings (PEBs) are currently constructed with wind forces in mind. According to IS 875 (Part III) - 1987, a manual wind analysis was completed..

Mitaali Jayant Gilbile (2020) In this study, a factory truss (an industrial structure) is examined and created in accordance with Indian Standards IS 800-1984 and IS 800-2007. For the current work's comparative analysis of pre-engineered buildings (PEB) and conventional steel buildings, various loads, including dead, live, wind, seismic, and snow loads according to IS standards, are taken into consideration (CSB). examine the effects of various parametric studies that were performed to execute the alterations in terms of shear force, support reaction, weight correlation, and cost assessment.

K. Prabin Kumar (2018) In a sense, it acts as the skeleton of the building, the part of the construction that holds everything up and together. Steel is fully recyclable, making it one of the greenest building materials. The necessity created by earthquakes is a significant factor in the evolution of structure design. The currently in use ISMB steel sections cannot meet the desired design specifications, especially for heavily laden buildings where moment of inertia and cross sectional dimension are crucial factors. It is simpler to build durable structures when using prefabricated structures since reinforced concrete pieces can also handle the maximum load, but they cannot be employed when the assembly is situated at a height of more than 50 to 60 metre.But like with all innovations, technology generates a special set of brand-new problems. So, using STAADPro, seismic analysis may be done efficiently.

T D Mythili (2015) In this article, an attempt has been made to compare traditional and pre-engineered steel constructions using a truss with a span of 30 metres and a crane that can lift 10 tonnes, 15 tonnes, and 20 tonnes. The amount of material has been significantly reduced. The building components were either ready-made or created in response to special orders, but the drawings were already made. Utilizing industrial techniques for cost-effective mass manufacture of components, these structures were pre-designed or "pre engineered" into standard sizes, spans, bays, and heights and employ standard details for fitting cladding, roofing, gutters, flashing, windows, and doors, among other things.

Manoj Kumar (2019)According to this study, pre-engineered steel buildings can also have mezzanine levels, canopies, fascias, interior partitions and other structural accessories. To make the structure waterproof, special mastic beads, filler strips, and trimmings are employed. All of the designing for pre-engineered buildings is done at a factory, and the building materials are supplied to the construction site already deconstructed. Effectively designed pre-engineered structures can be up to 30% lighter than conventional steel buildings. Lighter weight requires less steel, which could reduce the cost of the structural framework.

Bhupesh Kumar (2020) Using preconceived concepts, a 3D model of an industrial warehouse was created for this project, and after adequate validation, the frames were examined using the appropriate assessment and design tools. This study examines and develops a warehouse industrial structure in compliance with Indian standards (IS 800-2007) and additional American Standards (AISC LRFD). Pre-engineered buildings (PEB) and conventional steel structures (CSB) are compared side by side in the current work. Several loads, including dead, live, wind, seismic, and snow loads according to IS requirements, are taken into account (CSB). Several parametric experiments that were carried out to perform the modifications in terms of shear force, support reaction, weight correlation, and cost assessment were compared to see how they affected the results.

Rajnandan Verma (2020) Slabs make form the rigid framework in a pre-engineered metal building system, and major components (beam and column) connect the walls. This frame can span large distances without the use of any intermediary columns. The frame widths in the suggested building constructions are spaced out at intervals of 15 to 60 metres, and the span can rise up to 300 metres without a column. In this study (2013), an analysis of a pre-engineered metal building with a span of 40 m has been made using the finite element-based programme ETABS. For comparison, a conventional steel building with a span of the same length of 40 m is also evaluated using the same programme. The results of both analyses demonstrated.

M D Gawade (2018) In this work, we conducted a review of certain literature that is based on the PEB idea and design. We have also investigated the code provisions and conducted a quick analysis of PEB. The use of tapering members is another distinction. The moment that occurs at the section end is the foundation for tapered member sections. The fundamental principle put into practise is that where there is more moment, the section size is raised and where there is less moment, there is no need to give the

continuous section shown in CSB. As a result, PEB gives the part less weight.

Laishram Chandramani Singh (2021) As a result of developments in science and technology in the disciplines of structural engineering and civil engineering, pre planned structures have been adopted in the industrial and residential construction sectors. Even though pre-engineered building designs are available nowadays, designing a structure and determining its soundness used to be a time-consuming process. But due of the creation of several software programmes like Staad pro, pre-engineered building is now more useful to employ than traditional steel structure in the modern world.

Humanaaz Arif Qureshi (2020) In this work, The structure members are designed and created in a factory, then transported to the building site where they will be assembled. This study analyses and designs a G+3 industrial warehouse in accordance with Indian Standard Code IS 800-2007 (LSM).Using STADD-pro software, the warehouse building study was completed. Pre-engineered buildings (PEB) and conventional steel buildings (CSB) are also contrasted in this essay. The CSB follows IS 800:2007 (LSM) for design and analysis. This paper's goal is to discuss the tonnage-wise most cost-effective frame as well as potential causes of inconsistent outcomes. Additionally, a comparison of the cold-formed purlins used in CSB and the hot-rolled section utilised in CSB is made.

Vishnu Sai (2021) This process is flexible in addition to having excellent pre-designing and pre-fabrication, making it adaptive. The structural performance of multiple bay systems in various wind zones has been compared in the current study (Vijayawada and Hyderabad). STAAD.Pro software has been used for analysis and design. Shear force (SF) and bending moment (BM) magnitudes have been used to evaluate the structural performance of pre-engineered buildings based on the pre-engineered component output from SF and BM through Staad. The geometrical characteristics of pre-engineered portions have been determined after analysis. According to the findings, the structure weight in Vijayawada is 11.04% greater than the structure in Hyderabad.

Shubham Shrivastava (2022) In this paper, The Pre-engineering Structure (PES) system is a state-of-the-art development in steel structure design that enables reasonably priced, environmentally friendly buildings. Pre-engineered Structure (PES) type steel constructions can be quickly and easily built. Pre-engineered buildings are essentially steel constructions with sections that have been tapered to account for bending moments in order to avoid using additional steel. Pre-Designed Structure (PES), which makes use of steel structures and enhances design by ensuring economic safety, is a modern concept. The main objectives of this essay are to reduce time and resource utilization and to comprehend PES concepts.

Jaya Tamrakar (2022) This article also examines pre-engineered steel building systems, which are a component of pre-designed building concepts. The current building approach demands the best architectural beauty, superior construction quality, expedited completion, and cost-effectiveness, together with a dash of innovation. Pre-engineered steel buildings are one of the alternative building technologies that should be taken into consideration. Pre-Designed Buildings (PEB), which utilise steel structures and improve design by ensuring economic safety, are a modern concept. The main objectives of this essay are to reduce time and resource utilization and to comprehend PEB concepts.

T.D. Mythili (2017) This research focuses on the barriers to pre-engineered building technologies faced by newly emerging Indian enterprises and the key success criteria associated with these systems. Also briefly highlighted is how pre-engineered construction systems have helped India's economy flourish through a variety of uses.

IV. CONCLUSION

After carefully examining the aforementioned studies, we can conclude that steel can be used to design pre-engineered steel structures because it is a cheap material that also offers strength, durability, design flexibility, adaptability, and recyclability. According to the study's findings, PES structures are preferable over CSS structures. But we are unable to make a definite judgment. Pre-engineered structures should be used for all constructions. Due to the fact that the idea of PESs was formed from conventional practices and that there are some circumstances in which we are unable to apply PESs, such as Projects without the required finance for significant up-front costs or for quick constructions.

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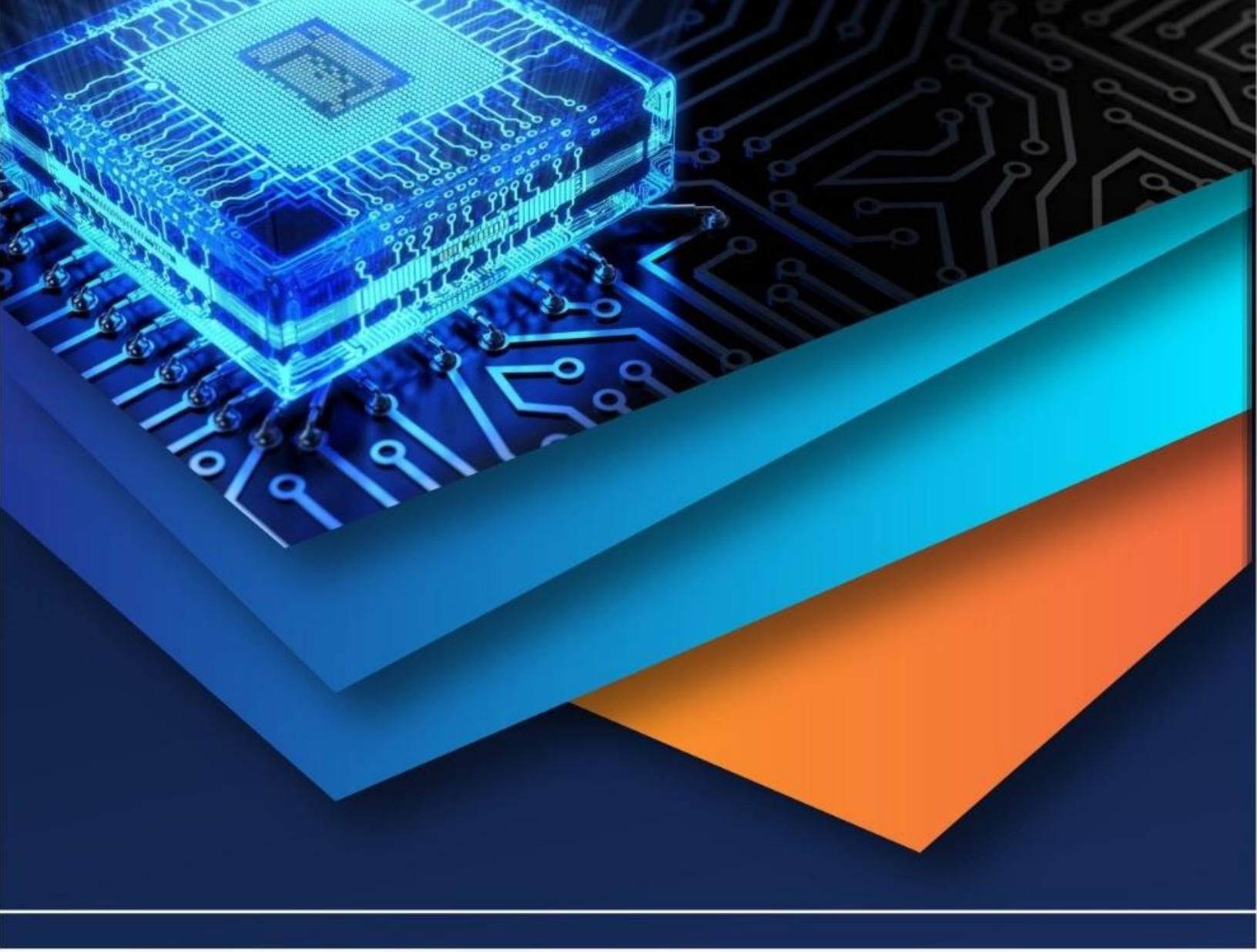

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