

An Investigation on Cost, Delay & Labor Problems in PEB Structure

Mr. Shashank B. Petkar¹ & Prof. A. B. Landage²

¹Mr. Shashank B. Petkar (M. Tech – Construction Management), Civil Engineering Department, Government College of Engineering Karad, Maharashtra, India

²Prof. A. B. Landage Assistant Professor, Civil Engineering Department, Government College of Engineering Karad, Maharashtra, India

Abstract - Over the course of the year, technological advancements have greatly aided in the enhancement of quality of life through a variety of innovative goods and services. Pre-engineered buildings are one such revolution (PEBs). Steel housing structures that are predesigned and prefabricated are used in the pre-engineered construction concept.

It is observed that pre-engineered steel building projects faced many problems due to irregular impracticable cash flow, unsuitable bill payment methods, improper project contractual methods, etc. It is proposed to enhance the financial stability of the contractor and to reduce the instances of unethical and unacceptable pressures on the contractor. To increase the productivity and the performance of the project crew, training personnel, and a proper salary payment scheme. The PEB structure should meet the IS standard. Timely delivery of the same and a binding agreement between the supplier and the client will be trouble-free progress of the project.

Key Words: Pre-engineered Building

1. PRE-ENGINEERED BUILDING

1.1 Introduction

India boasts the world's second-fastest-growing economy, thanks in large part to its construction industry, which ranks second only to agriculture in terms of economic contribution to the country. The construction industry has discovered, produced, and developed numerous technologies, processes, and products during its long history, one of which is the notion of pre-engineered buildings (PEBs). Rather than being produced on-site, PEBs are supplied to the site as a complete completed product from a single vendor, with a basic structural steel framework and linked factory finished cladding and roofing components. The structure is assembled on the job site by fastening the different building components together according to the blueprints. India's future lies in pre-engineered buildings (PEB). The majority of the Indian corporate community has just recently begun to recognize the advantages of PEBs. It's tough to alter when you've been constructing with concrete for as long as anyone can remember. However, India's most forward-thinking businesses are reaping the benefits of PEBs. The term "pre-engineered building" refers to constructions that have been

pre-cast and pre-fabricated. The Republic of India's future lies in pre-engineered buildings (PEB). PEB's low-weight, adaptable frames provide greater seismic resilience.

2 LITERATURE REVIEW

Firoz [1] said that pre-engineered steel building framework development has extraordinary favorable circumstances to the single-story structures, practical and efficient option into conventional structures, and the system addressing one central model inside multiple disciplines. Pre-engineered structure makes and keeps up progressively multidimensional, information-rich perspectives through undertaking support is as of now being executed by Staad pro programming bundles for plan and engineering.

Zoad [2] in this paper author's work on technological improvement over the years has contributed monstrously to the upgrade of personal satisfaction through different new items and administrations. In structural designing, aside from primary tasteful plan necessities, the measure obstacle was the pace of development and security standards. Improvement of PEB quickened the pace of development keeping up with all the safety factors.

Rambhau [3] said that investigations express roof trusses and purlins for large ranges for material saving and economy. It has been planned and looked at two trusses for internal forces, existing moments, and shear forces at critical cross-sections. The investigations express that the trusses gave along length required less material as compared with trusses gave along the width of the span. They have reasoned that the cost of development is less as compared with truss set along width of length & this gives a new technique for support placing in the roofing system.

Meera [4] works on a concept for single-story modern building creation is the Pre-Engineered Building (PEB). This procedure is flexible not just because of its quality pre-designing and prefabrication construction, yet in addition because of its lightweight and economical construction. The idea incorporates the method of giving the most ideal area as per the optimum requirement. This idea has numerous favorable circumstances over the Conventional Steel Building (CSB) idea of structures with roof truss. This paper is a similar investigation of the PEB idea and CSB idea. The examination is accomplished by stooping an ordinary edge of

a proposed Industrial Warehouse building utilizing both concepts and analyzing the designed frames using the structural analysis and design software Staad Pro.

Bhojkar [5] said that expense can be limited by using an ideal cross-part of steel. Additionally, they have indicated the different utilization of PEB. It has been indicated that for low ascent building, PEB is discovered to be more prudent than CSB. From their examinations, they reasoned that CSB is 26% heavier than PEB and likewise PEB is 30% conservative.

Prasad [6] explains that PEB structures have gotten very well-known over the most recent couple of years. The primary focal points are speed of development and great authority over quality. Anyway, there isn't a lot of data on its economy. There are many parameters, such as gable inclination, spans, bay spacing, which regulate the structure's expense. In the current paper, the above boundaries are changed methodically and for each situation, the gable frame is intended for the common loads such as DL, LL, EQ, and WL. The amount for each situation is acquired lastly the construction which manages the most reduced amount of steel is suggested.

Kiran [7] explains about Pre Engineered Building (PEB) concept in the building has aided in the improvement of the plan. The adoption of PEB in place of the conventional steel building (CSB) design idea resulted in many benefits, including cost savings and easier manufacturing. In this study, a mechanical structure (Warehouse) is examined and developed using Indian criteria, including IS 800-1984, IS 800-2007, and MBMA-96 and AISC-89. In this study, a structure with a length of 187 meters, a width of 40 meters, a clear height of 8 meters, and an R-Slope of 1:10 is used to analyze and design for 2D edges (End outline, outline without crane and casing with 3 module cranes). Between Indian codes (IS800-1984, IS800-2007) and American codes (IS800-1984, IS800-2007), the economy of the building is discussed in terms of its weight examination (MBMA-96).

Wankhade [8] has been given the significance of utilizing pre-engineered construction in development, essentially for single-story buildings. They additionally have demonstrated that conventional steel structure has inconveniences contrasted with pre-engineered construction. Relative investigation of pre-engineered buildings with conventional steel-building has been done by them. From their investigations, they have discovered that pre-engineered structures can be planned to utilize straightforward strategies. Likewise, they inferred that pre-engineered structure has different preferences over conventional steel working regarding cost, speed of development, etc.

Bhagatkar [9] said that in Pre-engineered Building (PEB) is a reasonable Construction method for developing nations. It is a blend of precast and prefabricated structures. Pre-engineered structures are for the most part low-rise

structures which are ideal for workplaces, houses, display areas, shop fronts, etc PEB will lessen the absolute development season of the venture by at any rate half. This also makes faster inhabitation and earlier sales identification. Structures can be provided with around 80m clear ranges. Steel is 100% recyclable and is the most reused material on the planet. Accordingly, every huge load of reused steel saves 2,500 pounds of iron metal and around 1,000 pounds of coal. The use of pre-engineered structures idea to low-rise structures is conservative and quick. The structure can be built in under a large portion of the typical time. Even though PEB frameworks are broadly utilized in mechanical and numerous other non-residential developments around the world, it is generally another idea in India. They assessed that PEB constructions can be effectively planned through straightforward plan strategies as per country principles, which are energy proficient, quick in development, saves cost, economical, and most significant it's dependable when contrasted with regular structures.

3. METHODOLOGY

It was discovered that meticulous preparation and a literature review are required for the creation of a questionnaire. A pilot research was conducted utilising the following approaches to acquire all relevant and significant data.

A review of the literature

It was useful to identify contractors' general perspectives on challenges they confront in PEB, as well as their fundamental classification of problems.

Discussions with specialist contractors to determine the current situation based on the previously prepared basic questionnaire were held with several contractors. Following that, the questionnaire was modified to get more relevant and useful data.

These findings led to the identification of the following primary areas, which were then included in the questionnaire.

1. The Economic Aspect

To assure continuous progress of a planned building project, the financial status and liquidity of money are critical. Several factors influence the amount of money invested in a project, including the contract total, advance payment, billing interval, bill payment, retention money, and additional labour.

2. Assessing Delays

PEB construction time is affected by a variety of factors to variable degrees. The number of days in delay, arrival of material on time, difficulty with technical details, alterations made to the intended building, and other criteria were considered while assessing construction project delays.

3. Labor-related issues

A PEB project that requires quick work in a limited amount of time may result in disagreement among the project's participants. Skills of steel, building erectors, manner of

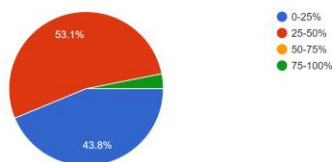
compensation payment, recruiting policy, shift work, over time work, and excessive work load were some of the aspects evaluated in identifying labor-related concerns.

4. RESULT

The data collection via the questionnaire, the raw data needed to be analyzed to meet the goal. For the convenience of comprehension, the following analysis is carried out under the same sections as the questionnaire. Contractors' responses to each question have been visually shown to make each piece of data more believable.

1. Economic aspect - For both the customer and the contractor, the financial status and liquidity of money are critical to maintaining the continuous progress of planned development in any given project. Several factors influence the amount of money invested in a project. The length of a project is also critical in PEB. According to a Google forum response, the contractor receives a smaller advance payment, often 96.9% less than 50% of the total amount. According to a study performed on the Google forum, there is a delay in payment of up to 2-4 weeks or more than 4 weeks after the bill is submitted. The majority of the time, the client pays in installments. This delay in getting funds produces a slew of issues on building sites and across the company.

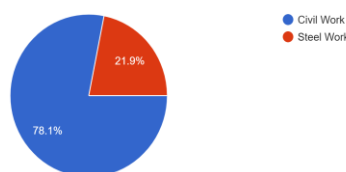
What was the percentage of advance payment for the project?
32 responses



Graph 1 Advance payment for the project

2. Assessing Delay- Delays and cost overruns are typical in building projects and a variety of factors influence the time it takes to build PEB to varied degrees. Delays can be caused by a variety of factors. As a result, the consequences and remedies differ from instance to situation. Concurrent delays happen when two or more delays occur at the same time and require distinct approaches to address. 78% delay due to civil work, according to the graph 2. As a result, it overlaps the project erection work, causing the project to be delayed.

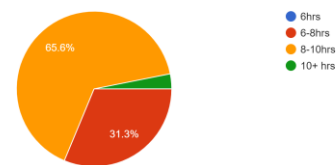
In your opinion the delay is mainly due to?
32 responses



Graph 2 Delay in which type of work

3. Labor related issues- The average individual works for around 8 hours every day. 68.7% worked more than 8 hours every day. Working overtime may be stressful for managers, since the site manager has one of the most difficult positions in the construction industry. When working overtime, transportation, food, and extra money must all be provided. Workers' productivity has been found to be lower on holiday days than on normal days, most likely because workers find it difficult to completely embrace working on a day that is normally intended for rest. Personnel training by a specialist trainer are not only greatly appreciated, but it also inspires them to a large level, especially in this sort of inventive building. Both the workforce and the construction businesses gain from these types of training programmes. While individuals profit in the long run from being properly taught, this helps them advance their careers, the firm benefits from more productive and proactive employees.

What were the working hours? _____
32 responses



Graph4.3 Working hours for labor

5. CONCLUSIONS

1. Finance aspect - Many issues are said to have arisen in the PEB project as a result of irregular payment, payment delays, insufficient advance payment, delayed bill payment, and so on. Because the number of projects handled by the former is greater and the project period is shorter, problems are encountered by contractors participating in other big civil works. As a result, there is a negative cash flow.

2. Delay - In PEB, one of the issues addressed was project length delays. Other determining criteria, such as the size of the building, the contract price, the project location, and so on, have little impact on the duration of a project. The construction's completion date is determined by the client's demand, which may be impacted by investor pressure. Therefore, in these projects, a lack of time in organizing resources such as men, machines, supplies, and funds creates a stressful scenario.

3. Labor related issues- PEBs are projects having a short lifespan and a substantial contract value. The project manager's job is critical in directing these quick projects without sacrificing quality or cost.

According to the research, the following elements have an impact on the project's performance:

- Lack of industrial training
- Non skilled workers Out of surveyed projects, 78% of project staff have not received any training on PEB systems.

- Improper salary payment such as monthly payment frequency does not assist to solve the financial problems of the workers.

2. Prof. A. B. Landage,

Assistant Professor, Civil Engineering Department, Government College of Engineering Karad, Maharashtra, India. Ph.D. (Pursuing), M. Tech, B.E., Diploma.

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BIOGRAPHIES**1. Mr. Shashank B. Petkar,**

PG Scholer (M. Tech – Construction Management), Civil Engineering Department, Government College of Engineering Karad, Maharashtra, India