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Pre-Engineered Building– A New Trend Of Industrial Building

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ABSTRACT

The concept of Pre-Engineered Building (PEB) has emerged tremendously after the initiation of various government schemes such as Make In India, Smart City Initiative and with increased approval from the FDI's demand for infrastructures. These kinds of buildings provide the required section as per the optimum requirement based on the bending moment. This method has pre-fabricated steel components that are assembled on the site and is lightweight and economical. Times being the controlling factor, the pre-fabricated steel structures are erected in less time and with ease.

Keywords— *Pre-fabricated, Pre-engineered building*

1. INTRODUCTION

The advancements in construction technology started in the Stone Age to the present concept of modern, economical and trendy buildings. Aesthetics, quality, the speed of construction, cost, utility, and innovation are the factors that govern the choice of the building. With the various initiatives by the Government, the need for the infrastructure has increased to a greater extent. In case of the pre-engineered buildings, the entire assembly is brought to the sites in the form of pre-fabricated members and are assembled on the site. The western countries have successfully implemented the concept of pre-engineered buildings and a typically new one in India. The basic idea is providing the optimum steel section as per the demand over a point. The demand over a point can be found out by the bending moment diagram; maximum the bending moment larger is the section. Thus there lies no uniformity in the element and varies over the section thus reducing the use of the resource.

1.1 Components of Pre-Engineered Buildings

Pre-Engineered Building is the buildings that are made to the requirements i.e. tailor-made. The components of the PEB can be divided into two major categories 1) Primary members 2) Secondary members.

1.1.1 The **primary members** are those which support the entire structure and can be referred to as the skeleton. These include:

- **Rigid Frame**: The connection of beam and column here is rigird henced named so. It holds the vertical loads considerably allowing clear larger spans. The interior, as well as exterior, can be flexible in appearance with full strength.
- **Wind Bracing:** Resistance to the developing lateral loads and stability of the steel structure can be maintained by the use of bracings. They are the diagonal members that prevent racking.
- **Crane Bracket:** This component gives the effective way of providing hosting service within the bays and across the shed.

1.1.2 The **secondary members** are the members which support the roof and wall sheeting transferring the loads to the primary members. These include:

- **Roof Purlins:** These are the framing members that allows the roofing deck or sheets to rest over them. These members are supported by the rafters on the bottom.
- **Wall Girts:** These members provide the lateral support to the wall panels to resist the wind load. They are laid along the perimeter of the structure.
- **Sag Rods:** These members prevent the sagging moment of the purlin.
- **Eave Strut:** This member forms the corner of the structure that corner of roof and wall panels. These members are located on the eave of the structure

1.2 Manufacturing Process

In PEB construction, manufacturing plant is the initial stage of construction where main framing units, secondary units, and sheeting members are prepared. The supply input for the manufacturing plant are

- Rolled Metal Plates
- Round bars
- Pre-painted
- G. I. Sheets

The manufacturing process for the Main framing members is briefly explained as follows:

- **Cutting:** In this process, rolled metal plates are cut into the desired dimensions for the preparation of flanges and web. It is done by CNC profile cutting plasma oxyfuel/ shearing YSD.
- **Detailing:** In this process, punching, drilling, flange splicing and flange punching processes take place. The flange plates, web plates and other connection plates which are required are detailed with the utmost accuracy.
- **Saw welding:** In this process, the individual I- sections are prepared through the welding process. The detailed members are assembled into a rigid I-section by the saw welding process.
- **Fitment:** The members that are prepared are assembled by other connection plates, stiffeners, etc in this fitment section. It has three basic processes and they are fitting, assembly and tack welding.
- **Manual welding:** Special joints are taken care in this section and the welding is done by manual procedure. Also, proper inspection of welding is done in this section. It is also commonly termed as "Final welding".
- **Finishing:** The members coming out of manual welding whose surfaces are not suited for painting as well as an aesthetic point of view. Members have gone through a thorough welding process, the surface needs to polish/finished well. The members after finishing are also treated with sandblasting process which helps in providing a firm base for coating purpose.
- **Painting:** Well finished members are brought to the painting zone. Painting is done to prevent the corrosion of steel from atmospheric actions and to achieve long-lasting durability. The proper dry environment is maintained in painting section and the required coat thickness of paint is achieved in DFT (dry finished thickness) and inspected by DFT meter. The coat thickness requirement varies from customer to customer as per the climatic conditions in which the structure is to be sustained. Primer is also applied as per the customer's requirements.
- **Shipment:** All the painted members are checked by the Quality department and then it is dispatched to the site through shipment. Proper safety care is to be maintained while loading of the painted members as rough handling by equipment may damage the painted coat thickness, or the transportation medium or the accident while placing the members taking care that the transportation media is not overloaded.

1.3 Advantages of PEB's

1) This type of building gives high flexibility, high quality, and aesthetics.
2) They have low maintenance in the day to day life.
3) Steel is an environmental friendly
4) These members can be recycled and used again and again.
5) The speed of construction is high
6) Economical in case of larger spans.
7) Foundations of these buildings are easy to construct and light in weight.
8) They offer high resistance to seismic forces.
9) Erection of the structure is simpler and easy.
10) The building accessories are easily interchangeable.

2. CONCLUSION

Following are the conclusions drawn from the study:

1) This paper easily conveys the process that is carried out to get the desired element is easy and simple.
2) It can also be concluded that the PEB structures are flexible, lightweight and economical over long spans.
3) From the last couple of years, the use of PEB as industrial sheds is increasing continuously.
4) It is sustainable and reliables that of conventional steel buildings.

3. REFERENCES

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