

A Review Study on the trussless sheeting with truss sheeting for different span of industrial sheds

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ABSTRACT

In this present study, comparing the cost of roofing on Steel (Angular) Truss, Hollow Tube Truss with Self-Supporting Roof for the opening of 6 meter, 12 meter, 18 meter and 24 meter. This paper presents a study on behaviour and economical of roof trusses and purlins by truss provided along large span due to material saving as compare roof truss provided along width. Roof trusses and purlins are therefore an integral part of an industrial building and the like for supporting the roofing system. This paper presents a study on behaviour and economical of part type roof trusses, This study involves in examination of theoretical investigations of specimens in series. Overall two truss were designed and comparison of all the internal force, economical, and hence, to evaluate the co-existing moments and shear forces at the critical cross-section with same configuration area by keeping all other parameters constant. The specimens are designed under uniformly distributed loading with simply supported condition. The research project aims to provide which span of truss is economical, high bending strength, more load carrying capacity and high flexural strength. The studies reveal that the theoretical investigations roof truss provided along large span design is high bending strength, high load caring capacity, save material, economical as compare truss provided along small span.

Keywords: Truss, Hollow Pipe, Tubular Pipe, GI trussless Sheet, Steel (Angular) Truss STAAD.Pro V8i,

INTRODUCTION

The roofs are not only to protect the structure and its internal element but they also give an aesthetic view to the structure. As the roof occupies a very huge area and consumes large amounts of material for its construction, optimal design of such a structure is of utmost importance. The earlier research on the roof structures was mainly concentrated on the geometric design of the roof structure, giving less or no significance to the structural engineering aspect. But once the financial implications associated with roof system is confronted, the need for economical structural system is fully realized. With the invention of self-supporting structural elements as roof covering, it is now possible to develop innovative shapes of roofs especially for industrial, sports & other service buildings and public areas where long spans are desirable. Steel is a material which has high strength per unit mass. Steel as a construction material is one of the very important materials used in the industry, the reason is because of its characteristics and properties that it has. Steel is strong, hard, tough, ductile, fire resistant and has also got a very high melting point. The designing of industrial Steel Structure includes designing of the structural elements including principal rafter or roof truss, column and column base, purlins, sag rods, tie rods, gantry girder, bracings, etc. India has the second fastest growing economy in the world and a lot of it, is attributed to its construction industry which figures just next to agriculture in its economic contribution to the nation. So, in regard of the same Steel industry is growing rapidly. The use of steel structures is not only economical but also ecofriendly at the time when there is a threat of global warming. Here, "economical" word is stated considering time and cost.

OBJECTIVES

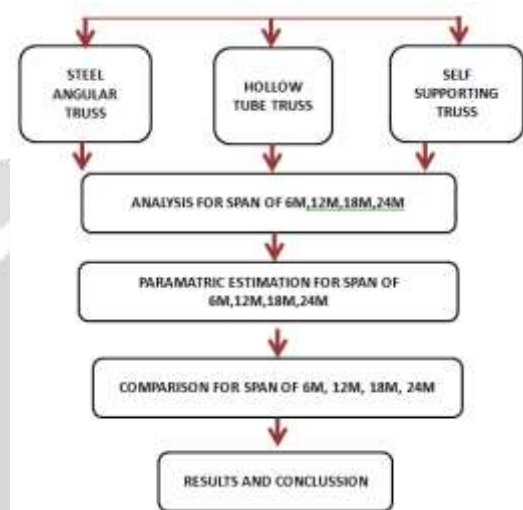
1. Analysis of roofing with truss and trussless.
2. Effect of changes in section of roof truss.
3. Optimization of roofing system for industrial sheds of varying type of span.
4. Design and estimation of the all cases.

PURPOSE OF STUDY

Self-supporting Roofing is a constructive solution in which there isn't always any support roofing structure. The metallic profile is supported at the load beams. It is a metallic ribbed profile which it is curved by means of inlaying. This profile is fixed with screws to the beams. Way to this fact, this solution is the lightest one in the market.

For this fact, in this present study comparison of roofing is done between the Steel (Angular) Truss, Hollow Tube Truss and Self-supporting Roofing for different openings. From this study conclusion will be made that which roofing is cheaper as compared to others.

METHODOLOGY



LITERATURE REVIEW

- 1) **Chavan & et al. (2014)** The study aims to evaluate the economic significance of the Hollow Structural Sections (HSS) in contrast with open sections. This study was carried out to determine the percentage economy achieved using Hollow Structural Sections (HSS) so as to understand the importance of cost effectiveness. The technique used in order to achieve the objective included the comparison of different profiles for various combinations of height and material cross-section for given span and loading conditions. The analysis and design phase of the project was performed using STAAD PRO V8i. The sample results of STAAD analysis were validated with the results of Manual analysis
- 2) **Kalyanshetti, & Mirajkar (2012)** Most of the steel structures are built-up with conventional sections of steels which are designed and constructed by conventional methods. This leads to heavy or uneconomical structures. Tubular steel sections are the best replacements to the conventional ones with their useful and comparatively better properties. It is obvious that due to the profile of the tube section, dead weight is likely to be reduced for many structural members .which derives overall economy. This study is regarding the economy, load carrying capacity of all structural members and their corresponding safety measures. Economy is the main objective of this study involving comparison of conventional sectioned structures with tubular sectioned structure for given requirements. For study purpose superstructure-part of an industrial building is considered and comparison is made. Study reveals that, upto 40 to 50% saving in cost is achieved by using tubular sections.
- 3) **Nora & et al. (2015)** The main purpose of this study is to regarding the economy, load carrying capacity of structural member. This study involving comparison between sectioned structural members for given requirement of superstructure part of an industrial building. Study reveals that, upto30% to 40% saving in cost is achieved by using tubular sections.
- 4) **Shujat & Desai (2018)** This study provides the comparative study of Conventional steel building (CSB), Pre Engineered Building (PEB) and Tubular Structure. The design is made as per IS 800-2007. Dead load, Live load and wind load calculation is made IS 875 part I, II and III respectively. The concept includes the technique of providing the best possible section according to the optimum

requirement. This concept has many advantages over the Conventional Steel Building (CSB) concept of buildings with roof truss. Design and analysis is done with the help of STAAD Pro V8i Software.

- 5) **Kureshi & Desai (2017)** In this study the foot over bridges are made up of different steel sections and these steel sections are either conventional steel sections or closed hollow section. For instance, angle section, circular hollow steel section (CHS), rectangular hollow section (RHS) and square hollow section (SHS). An exertion has been done here to calculate discrepancy in weight between conventional steel section and closed hollow section with different truss configurations like Pratt truss, Howe truss and Warren truss. Even an attempt has been done here to analyze and design of foot over bridge with multiple truss configuration and all the data's are checked for both steel sections using draft code IS 800:2007, IRC:SP:56-200 and IS 806 for limit state design. Manual calculation is verified by software STAAD PRO V8i. The outcome received by both steel sections is elevated in form of consumption of steel with different heights, spans and configurations.
- 6) **Bokade & Vairagade (2017)** Industrial building is the design and construction of buildings serving industry. Such buildings rose in importance with the industrial revolution, and were some of the pioneering structures of modern architecture. Paper covered two types of industrial building such as conventional and pre-engineered building. Pre-Engineered Building (PEB) concept is a new conception of single storey industrial building construction. This methodology is versatile not only due to its quality pre-designing and prefabrication, but also due to its light weight and economical construction. The concept includes the technique of providing the best possible section according to the optimum requirement. This concept has many advantages over the Conventional Steel Building (CSB) concept of buildings with roof truss.
- 7) **Jayaraman & et.al. (2014)** This study involves in examination of theoretical investigations of specimens in series. Overall two methods were designed and comparison of all the internal force, economical, and hence, to evaluate the co-existing moments and shear forces at the critical cross-section with same configuration area by keeping all other parameters constant. The theoretical data are calculated using Indian Standard code IS 875-1975 (part III), IS 800 – 2007 using limit state method, IS 800- 1984 using working stress method and the section properties of the specimens are obtained using steel table. The specimens are designed under uniformly distributed loading with simply supported condition. The studies reveal that the theoretical investigations limit state method design is high bending strength, high load carrying capacity, minimum deflection and minimum local buckling & distortional buckling compare to the working stress method. But working stress method is most economical compare to the limit state method design.
- 8) **Sharma & Singh (2018)** Maximum of the metal systems is built up with conventional sections of steels that are designed and built through conventional methods. This ends in heavy or uneconomical structures. Tubular metal sections are the great replacements to the traditional ones with their beneficial and comparatively better residences. Its miles apparent that due to the profile of the tube section, dead weight is likely to be decreased for lots structural members .which derives ordinary economy. This study is concerning the financial system, load wearing ability of all structural participants and their corresponding protection measures. Economy is the main goal of this look at regarding assessment of conventional sectioned systems with tubular sectioned structure for given necessities. For look at purpose superstructure-part of a business building is taken into consideration and evaluation is made. Examine famous that, up to 40 to 50% saving in value is performed by means of using tubular sections.
- 9) **Meena and et. al. (2015)** This paper viably passes on that Pre-Engineered Steel building can be effectively structured by basic plan strategies in understanding Low weight adaptable casings of Pre-Engineered Steel building offer higher protection from tremor loads. In the wake of breaking down, coming up next are the finishes of Pre-Engineered Steel Building when contrasted and Conventional Steel Buildings.
- 10) **Bhadoria and Pathak (2017)** Comparative investigation made on different models of Pre-Engineered Building and Conventional steel structure demonstrates that PEB is a practical choice and it tends to be inferred that up to a specific estimation of clear range Pre-built structure are most conservative alternative and after a particular range steel amount in PEB is practically same as that of ordinary steel structure. Arrangement of decreased segment in PEB makes it affordable and decreasing of segment is done according to the twisting minute graph. From all the examination caused it to can be reasoned that

steel utilization in PEB is on a normal 30% lesser than ordinary steel structure. PEB casings are light and more adaptable than ordinary steel outlines and give higher protection from seismic powers.

- 11) **Katkar and Phadtare (2018)** as of late, the presentation of Pre-Engineered Building (PEB) idea in the plan of structures has helped in advancing structure. Long range, Column free structures are the most fundamental in a mechanical structures and Pre Engineered Buildings (PEB) satisfy this necessity alongside diminished time and cost when contrasted with customary structures. This philosophy is adaptable not just because of its quality pre-designing and construction, yet in addition because of its light weight and prudent development. The present work introduces the near investigation and plan of customary steel outlines with solid sections and steel segments and Pre Engineered Buildings (PEB). In this work, a modern structure of length 44m and width 20m with material framework as customary steel support and pre-built steel bracket is investigated and planned by utilizing STAAD Pro V8i.
- 12) **Wankhade and Pajgade (2014)** This paper adequately passes on that PEB structures can be effectively planned by straightforward plan strategies as per nation gauges. In light of the examination, it very well may be presumed that PEB structures are more worthwhile than CSB structures as far as cost viability, quality control speed in development and straightforwardness in erection. The paper likewise confers straightforward and affordable thoughts on starter structure ideas of PEBs. The idea portrayed is useful in understanding the plan system of PEB idea.
- 13) **Subashini and Valentina (2015)** This paper adequately passes on that PEB structures can be effectively planned by basic plan methods as per nation benchmarks. Low weight adaptable edges of PEB offer higher protection from quake loads^{18,19}. PEB rooftop structure is practically 26% lighter than customary Steel Building. In auxiliary individuals, lightweight Z purlins are utilized for PEB structure, while heavier hot-moved segments are utilized for CSB. Bolster responses for PEB are lesser than CSB according to examination. Lightweight establishment can be received for PEB which prompts straightforwardness in structure and decrease in expense of development of establishment. Substantial establishment will be required for CSB structure. PEB Building cost is 30% lesser than the expense of CSB structure¹⁷. PEB offers minimal effort, quality, solidness, structure adaptability, flexibility and recyclability. To finish up Pre-Engineered Building development gives end clients a substantially more efficient and better answer for long range structures where enormous section free regions are required.
- 14) **Bhagatkar and et. al. (2015)** From the past headway, the utilization of PEB is executed and consistently expanding, however its use isn't all through the development business. It is investigated that PEB structures can be effectively planned by straightforward plan systems as per nation norms, it is vitality productive, expedient in development, spares cost, practical and most significant its dependable when contrasted with ordinary structures. In this way PEB technique must be executed and investigated for more yields.
- 15) **Thakre and Vairagade (2016)** In this paper the pre-designed steel Building framework development has extraordinary points of interest to the single story structures, pragmatic and proficient option in contrast to regular structures, the System speaking to one focal model inside various controls. . The adoptability of PEB in the spot of Conventional Steel Building (CSB) structure idea brought about numerous preferences, including economy and simpler manufacture. In this examination, a mechanical structure (Ware House) is dissected and planned by the Indian models, IS 800-1984, IS 800-2007 and furthermore by alluding MBMA-96 and AISC-89. The economy of the structure is talked about as far as its weight examination, between Indian codes (IS800-1984, IS800-2007) and American code (MBMA-96), and between Indian codes (IS800-1984, IS800-2007).

CONCLUSSIONS

In this paper investigation, comparing the roof truss and trussless sheeting provided along length to truss provided along width of span. The studies reveal that the truss provided hollow tube truss and trussesless sheeting are required less material as compare to Angular truss provided along width of span. Due to this investigations cost of construction of hollow tube truss and trussesless sheeting should be less as compare to Angular truss placed along width of span. This is new method of truss placing in roofing system.

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