

DESIGN OF STEEL STRUCTURE OF AN AUDITORIUM

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ABSTRACT:

Auditorium roof is covered by R.C.C Dome structure from ancient time due to which after decades when the auditorium is to be modified and extended than a large amount of scrape is gained which is waste and again a hard labor is required for reconstruction. Hence in order to overcome this problem a curved roof of steel structure is made in place of dome which can

be easily extended whenever required with good strength. In order to increase the audience capacity inside the hall and to reduce the number of columns in between the audience for clear visibility as columns inside hall creates hindrance for visibility. A Span length of 30m is selected. In order to bring this concept a rectangular hall is considered with dimensions 30m × 68 m × 9m. A prototype is made in STAAD. Pro and the steel curved roof are checked for pipe and tube sections. Initially hit and trial method is used for section selections than optimization is done in STAAD. Pro and finally cost estimation is done and best section is suggested.

KEYWORDS: RCC, Dome, Truss ,Span

INTRODUCTION:

Everything that is attached to the ground and can't move is classified as a structure, regardless of how many parts there are.

It is the job of structural engineers to ensure the efficiency and stability of construction projects. Structural engineers are responsible for everything from buildings to bridges to oil rigs, and they do it all.

Everything from building and maintaining roads and bridges to designing and implementing navigational aids and flood control systems will fall under your purview as a civil engineer. A civil engineer is a type of engineer who specialises in civil infrastructure projects such as building pipelines, designing transportation systems, or developing environmental or maritime engineering solutions. Originally, it was used to differentiate it from military engineering.

For more than a century, structural engineering has been regarded as a distinct branch of engineering. For William R. Spiller, structural analysis is all about finding out how things will hold up under external pressure (e.g., wind deflection, bridge reaction to an approaching train). Real structures are incomprehensibly complex if the usual analysis simplifications aren't used. At first glance, the structural model appears to be quite different from the real thing.

Listed here are a few of the most essential parts:

- One-dimensional: Ropes, struts, beams, arches.
- Two-dimensional: Membranes, plates, slab, shells, vaults.
- Three-dimensional: Solid masses.

The weight of a building is supported by joists, beams, and walls, which are structural components. The walls of storage compartments are structural elements despite their lack of weight-bearing capacity. In order for the roof to be part of the structure, there needs to be a floor there. Everything to do with the ability of a building to support the weight and movement of its occupants is unrelated.

There is no "superstructure" if there is no screed or if the lowest finish on that level is lower than the "superstructure" level. These pages provide detailed explanations of the terms "substructure" and "superstructure."**(Buildings, 2021)**

Structural systems

Many built assets, including the building itself, depend on structural integrity. Steel beams run the length of the building, supporting it from the inside out. The roof is commonly supported by a space frame system.

LITERATURE REVIEW

(Garg & Ambrosius, 2018)“For emerging economies where corporate social responsibility (CSR) is still a relatively new notion”, it is a significant commitment that necessitates significant resources. However, this idea has been widely accepted in India for many years. CSR practices in modern Indian firms will be examined in light of the ancient Indian notion of "giving," which this article is attempting to analyse. For this reason, the results of this research show that Indian firms participate in CSR not “just to ensure that they are adhering to the” highest standards of corporate governance and ethical business practices, but also to help the country flourish. It presents an explanation of how the ancient Indian practice of 'gifting' remains relevant in today's management environment via the lens of selected Indian enterprises, as India's internationalization continues.

(Ganga Sasidharan Dhanesh, 2015)“In academic research on corporate social responsibility (CSR) communication, functionalist or critical approaches are frequently used”, with dialogic approaches being less common. In the current study, we use a dialectical method to investigate how Indian organizational actors use communication to define and define “corporate social responsibility. Based on in-depth interviews with” top executives of socially responsible Indian enterprises two crucial dialectics have emerged in the discourse creation of CSR “as inclusive development and shared social responsibility” in India “Analysis of findings for future CSR” communication study is included in this essay's conclusion.

(Gorski et al., 2014)More specifically, it's aimed at determining public knowledge of CSR as well as the planning and organization of CSR activities in Romania's Central Development Region. The information presented here is based on a comprehensive investigation of whether or not companies have adopted CSR practices. The data from the survey was organized and analyzed using SPSS. Data shows that CSR practices are poorly understood and implemented in the organizations studied. Following the outcomes of the investigation, we provide several recommendations.

(Guan & Noronha, 2013)Many books on corporate social responsibility may be found in the world's fastest developing economy, China (CSR). The goal of this study is to encourage new paths in CSR research in the United States via critical debate and analysis. CASS has done two key studies on corporate social responsibility (CSR) (CSR). The bulk of China's CSR literature, according to the findings, is conceptual, descriptive, or argumentative. Inconsistencies in the use of recognized research procedures and poor underlying ideas have been found in several studies. Research on CSR performance evaluation uses self-created indicator systems, rather than commonly established techniques, to measure success. There is still a long way to go in China's CSR research, which has only just begun. Reputation/authenticity “Emerging economies, such as” Bangladesh, India, Indonesia, and Malaysia, have been highlighted in recent literature on “corporate social responsibility. A review of CSR research in the Chinese mainland” has never been done before. Chinese CSR research can be better-understood thanks to this study. Numerous new study topics are proposed following the evaluation and debate.

CODES CONSIDERED IN THE STUDY

Design Operations

It is possible to design and analyse structural elements independently using STAAD. Designers can accomplish a wide range of tasks with the help of these tools. Depending on the complexity of the design, it may be necessary to only use some of these tools in certain situations.

“The operations to perform a design are:”

- A central repository for all the components and load cases to be taken into account during the design process
- It is possible to conduct code reviews and member selections.
- The default values of the parameters can be changed.

Code Checking

Members of the members' section and their children are the primary focus of code inspection. It is necessary to verify accuracy by comparing results to those set forth by the AISC. To ensure that the code is functioning properly, members are subjected to a variety of forces and moments. Code checking falls back to using the start and end forces if there is no section number. Participants' progress is tracked through the use of code checking. The Load and Resistance Factor Design Specification was created using the limit state design concept. Structural engineers are currently advocating this method (LSD). When determining the size and design of a structure, it is important to take into account its flexibility. Defining an operational or ultimate limit state is based on the context in which it is employed. The limit state must be both strong and stable in order to be useful. Because of their strength and adaptability, steel structures can take on a wide range of loads when designed correctly. The building's safety and usability will not be jeopardised if structural members' maximum capacity is exceeded. The depth of the members and the desired section type are used to calculate section costs. Coding requirements and criteria for the programme are identified and checked by the program's code-checking section.**(Csernak, 2012)**

Auditorium Design

- “The truss of the structure is a Trapezoidal mansurd Roof Truss.”
- “The designed columns are R.C.C columns.”
- “The truss design in tubular truss”

“As tubular sections prove to be economical. Total saving of almost 50 % to 60 % in cost is achieved. Out of circular, square and rectangular shapes, due to connection difficulties of circular tube sections, it is suggested to adopt rectangular or square tube sections.”

- “Mansard Trusses (20-30m) are variation of fink trusses, which have shorter leading diagonals even in very long span trusses, unlike the fink and fan type trusses. The economical span lengths of the pitched roof trusses, excluding the Mansard trusses, range from 6 m to 12 m.”
- “The Mansard trusses can be used in the span ranges of 12 m to 30 m.”

CONCLUSIONS

It is concluded that software is more reliable and efficient than manual effort in the design industry. The findings obtained by the software were found to be more cost-effective and efficient, taking into account a wide range of variables that are difficult to account for manually. Column footings are given with isolated footings. An auditorium can be built on a budget, and that is the focus of this project. Artificial lighting and ventilation have been implemented due to current market trends. Roofing with a fake ceiling is being considered. Load Calculation, Design of Slabs, Stairs, Beams, and Columns and Footing have all been incorporated into this project. STAAD Pro was used to perform a 2D analysis of the building. Manual computations were also performed in conformity with the applicable codes. It has been decided to create architectural drawings.

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