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Bridge Structure Study on the Dome of the Boarding School's Mosque at Pringsewu District in Bandar Lampung

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Abstract: A single paragraph of about 200 words maximum. For research articles, abstracts should give a pertinent overview of the work. We strongly encourage authors to use the following style of structured abstracts, but without headings: (1) Background: Place the question addressed in a broad context and highlight the purpose of the study; (2) Methods: Describe briefly the main methods or treatments applied; (3) Results: Summarize the article's main findings; and (4) Conclusions: Indicate the main conclusions or interpretations. The abstract should be an objective representation of the article, it must not contain results which are not presented and substantiated in the main text and should not exaggerate the main conclusions.

Keywords: keyword 1; keyword 2; keyword 3 (List three to seven pertinent words)

1. Introduction

1.1. Background

Islamic architecture as a foundation in building Muslim worship facilities in the form of mosques has developed its meaning along with advances in science and technology. In several mosque designs in Indonesia, Islamic architecture is often applied to the facade, interior and layout of the mosque as a whole.

1.3. Purpose & Urgency

The Klangenan Mosque as part of the Insan Mulia Boarding School Pringsewu educational building complex also applies the principles of Islamic architecture in its design. Namely by trying to make the main prayer area not have a middle column for the sake of pursuing the virtues of congregational prayer. There are several opinions among the scholars regarding the issue of praying on separate rows from the pillars. Some hated him, like Abdullah bin Mas'ud. Hudzaifah bin Yaman, narrated from Ibn Abbas. This is because the pole breaks the shaft. Some of the scholars gave relief, they were Ibn Sirin, Malik and ashaburra'yi their reason was that there was no authentic hadith indicating a prohibition from the Prophet sallallaahu 'alaihi wa sallamahu 'alaihi wasallam, as for Anas who said they avoided it then it only shows the best.

1.2. Problems

The Klangenan Mosque is a mosque located in the Insan Mulia Boarding School Educational building complex with thousands of students from junior high to high school. This is a consideration

in the design process, especially in determining the capacity of the mosque and creating the effectiveness of the room both when it is used for prayer activities, as well as for ta'lim (religious education).

Advances in construction technology have had a good enough impact to make it easier for architects to have alternative structures used in their designs. However, each design has its own challenges, including the factors of user needs, the geographical conditions of the site, and the available construction costs. This not only has an impact on the design in appearance but also has an impact on the planned structure. Given that there is still little literacy in Indonesia that discusses the structure of steel rafting and is complemented by case studies, then to enrich literacy related to this matter, this research is then deemed necessary to be carried out.

2. Materials and Methods

In this study, we will examine the structural modeling of the Klangenan mosque using a rafter steel structure with a bridge structure model. Building modeling uses ETAB software with reference to SNI 1729:2015 and SNI 1726:2012.

3. Results

3.1 Theoretical basis

In determining the shape and dimensions of a steel construction, we are required to comply with the provisions and regulations that apply in Indonesia. With these provisions and regulations, it can be used as a basis or guideline for planning a construction in terms of the materials used, the external loads/forces acting on a construction, and the permissible stresses. The magnitude of the load acting on a structure is regulated in the Indonesian Loading Regulations for Buildings, 1983 while the problem of the combination of working loads has been regulated in SNI 03-17292002 article 6.2.2.

The load of a steel building construction can be distinguished as follows:

a. Dead Load

Dead/fixed loads are the weight of all parts of a construction that are fixed during the service life of the structure, including all additional elements, completions which are an integral part of the construction. To determine the dead load in the design of the steel truss, there are several dead loads that must be taken into account, including: - the weight of the steel truss itself - the weight of the roof used - the weight of the curtain rods - the weight of the trekstang - the weight of the bracing / wind ties and - the weight of the connectors easel such as connection plates, bolts and nuts.

b. live load

Live loads are all loads that work on the structure during its service life, and arise as a result of occupancy or use of a construction. This load includes human weight, movable furniture and other items.

c. Wind Load

Wind loads are all loads acting on a construction caused by pressures from wind movement. Wind load is highly dependent on the location of the building and the height of the structure. The minimum wind pressure is 25 kg/m2. Blow pressure for locations at sea or by the sea (up to 5 km from the coast) a minimum of 40 kg/m2. For areas near the sea and other areas where wind speeds may produce blow pressures greater than specified, the blow must be determined using the formula.

This section may be divided by subheadings. It should provide a concise and precise description of the experimental results, their interpretation as well as the experimental conclusions that can be drawn.

d. Special Expenses

Special loads are all loads acting on a construction that occur as a result of differences in temperature, lifting, installation, lowering of foundations, shrinkage, additional forces originating from live loads such as brake forces originating from taps, centrifugal forces and dynamic forces derived from machines and other special effects. Earthquake loads in this calculation are not included in the evaluation

3.2 Analyst Method

The description of the condition in the field is that the Klangenan Mosque has a truss span of 17 m', the height of the building from the ground level to the top of the dome is 18.8 m'. By holding the dome weight of 8 tons and the GRC ceiling weight of 4 tons. The slope angle of the roof is 15º, the roof covering material uses 0.4 mm thick galvalume, the gording uses CNP 125x50x20x2.3 mm. The absence of a comprehensive written study regarding roof construction on buildings is what made the author the basis for conducting a study of the structure.



Figure 1. Superstructure Development Documentation

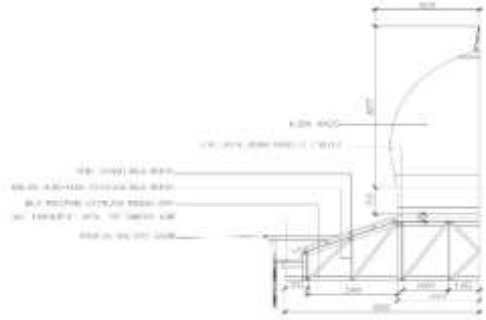

Figure 2. Detailed Drawings of Roof Structures

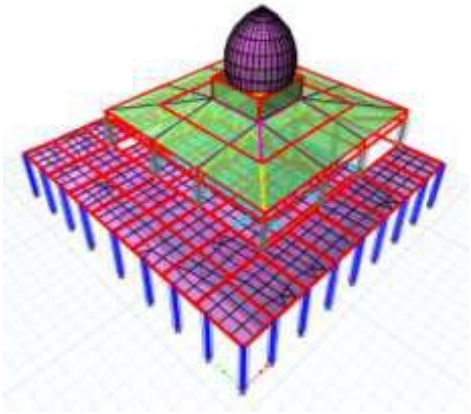

Figure 3. Mosque Structure Modeling Output

After doing trial and error on the weight of the dome. It is known that the frame structure can withstand 14.184 Tons (not including the 1.2 SF dead load), so the overall load of this frame is capable of receiving a load of 17 Tons. The results of running the etabs application are as follows:

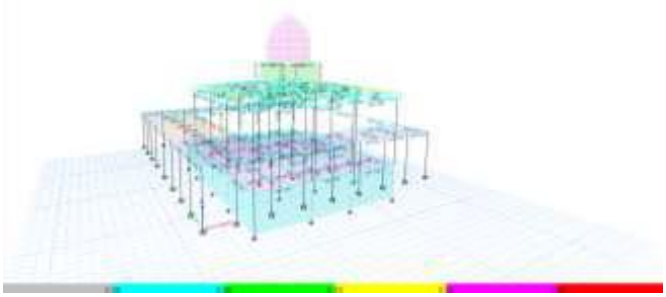

Figure 4. Model Check

From the above results the stem capacity has reached a maximu of 0.98 < 1 (OK). then this frame structure is capable of overall receiving a load of 17 Tons.

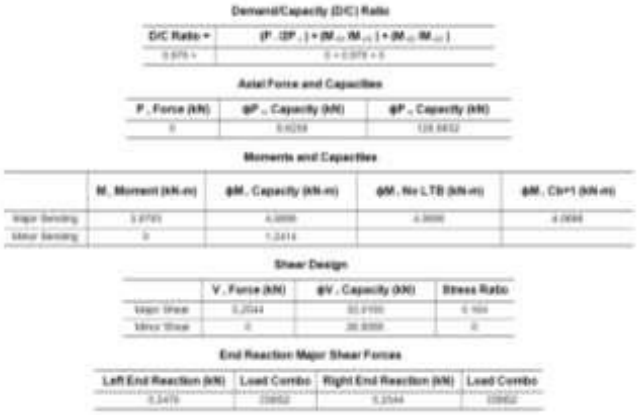

Figure 5.Sampling check

4. Conclusion

From the above results the stem capacity has reached a maximum of 0.98 < 1 (OK). then this frame structure is capable of overall receiving a load of 17 Tons.

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