

Service Load Analysis of Timber Construction Truss

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Abstract. This study aims to determine the service load capacity of existing truss construction using the wood material. Analysis and calculations were performed on tensile members, compression members, connection, and deflections that occur using the standard SNI 7973 : 2013. The existing truss construction needs to be analyzed for its overall strength so that the function of the building can be maximized. The results of the research on the existing truss construction obtained that the value of the truss construction capacity in carrying the service load was due to the strength of the connection with a service load of 350 kgf/m. The deflection that occurs is 35.5 mm, far beyond the maximum deflection of 7.14 mm, so it is necessary to repair the connection by increasing the number of connecting devices or replacing the connection tools using bolts.

Keywords. Timber truss construction, cross-sectional capacity, service load.

1 Introduction

The development of knowledge in the current era provides many solutions to the problems faced by society[1]. One of the problems in the construction sector is the availability of construction materials at the job site for construction[2][3]. The availability of construction materials is very influential on the selection of materials to be used to reduce the cost of transporting the materials needed[4][5]. Wood is a renewable natural resource but the availability of wood as a building material is increasingly difficult to obtain due to the decreasing forest area due to development and the lack of reforestation activities. The use of wood for construction in big cities is starting to be replaced by other materials such as mild steel, aluminum, and other modified materials, considering the distance to transport wood from production forest areas and the difficulty of obtaining wood, so that the price of wood materials increases considerably in urban areas. In addition, wood can also be eaten by termites[6][7].

In areas that still have extensive forests, the selection of construction materials using wood is still the main choice because the price of wood materials is relatively affordable in the area[8][9]. In addition, wood has advantages as a construction material that has a shape that cannot be imitated by other materials so wood materials remain part of the community's choice in the building[10][11]. Wood as a building construction material has its reasons for choosing it even though the development of advanced material technology is increasing.

The wood material used as construction material must be maintained so that more serious attention is needed in its maintenance according to the function of the construction of the building[12]. Existing truss construction requires research related to the overall strength of the construction so it is necessary to analyze the existing truss construction to evaluate to determine the service load/service life of the truss construction. In addition to this, based on visual observations, the deflection that occurs in the truss construction is also quite large. Analysis of the strength of the truss construction was carried out using the SNI 7973:2013 standard.

2 Research Methods

2.1 Research Model

The truss analysis was carried out on two-dimensional trusses taken from the existing truss construction with the warren truss model truss construction which can be seen in Figure 1 below:

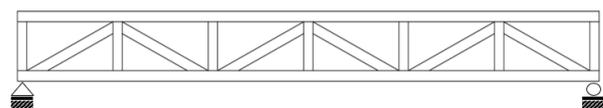


Fig. 1. Truss Frame Construction

The beam used is 4/8 cm of wood. The truss connection uses 4.2 mm diameter nails with a length of 104.3 mm. The bottom members consists of 2 beam units, the top members, the vertical members and the

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tensile strength of the truss construction elements used is quite large with the ability to carry a load of 10,664 kg and the compression bar is capable of carrying a load of 3610 kg. The strength of the truss construction can be increased by improving the connection between the rods so that the workload carried can be increased.

Based on the deflection that occurred in the field, the value of the deflection of the truss structure is 35.5 mm which far exceeds the deflection of the truss construction permit of 7.14 mm so the structure needs to be strengthened by making improvements to the joints used.

4 Conclusion

Based on the results of the analysis of the truss used, the value of the workload that can be carried by the truss construction used is 350 kg. This occurs due to the strength of the connecting equipment used which is smaller than the tensile strength and compressive strength of the truss elements used. Repair of joints can increase the strength of the truss construction in carrying the working load.

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