

Abstract

Title of the research project:	Study on Concrete Infilled Tubes as Compression Members in Truss Type Light Vehicular Bridges
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Applicability of concrete filled steel tubes (CFST) for compression members in truss type steel pedestrian bridges is studied in this research as an economical solution for the lack of pedestrian bridges in Sri Lanka. There are many places in Sri Lanka where people have to travel long distance to cross rivers or access the nearby city for their day to day needs. CFST is a composite material which is getting more popular in the civil engineering industry. So, it is important to examine the properties of CFST as a composite material.

Therefore, to achieve a higher span with a lesser cost (steel tonnage), usage of CFST sections for compression members have been accessed in this study. Also, the tendency to local buckling was examined with experimental and numerical simulations. A desk study was carried out focusing Gin Ganga area to identify the problems in the area due to lack of bridges. Two experimental model bridges were tested in this study as one with only hollow Aluminium tubes and other with cement grout filled in selected top chord members. Using a real scale numerical simulation of a CFST bridge model, practical applicability and cost figures were compared with a conventional steel truss bridge.

Parker truss was identified as the truss type which consumes the least tonnage for any particular span due to the variable shape of the truss. Experimental testing of two arch bridges showed similar failure mode for both hollow and concrete grout infilled sections (GFAT) incorporated trusses. Nearly 18% capacity enhancement could be observed for the GFAT incorporated truss compared to the truss made of hollow sections. The use of CFST for the compression members in the top chord instead of using large steel sections, will improve the structural performance, while minimizing the cost of a variable height bridge.

Following papers were published based on the results of this research project.

1. Bogahawaththa, P. B. M. R., **Hidallana-Gamage, H. D.** & Baskaran, K. (2019). Investigate an Economical Truss Type Steel Pedestrian Bridges for Sri Lanka, Paper presented at the *International Conference on Civil Engineering and Applications 2019 (ICCEA 2019)*, Department of Civil Engineering, University of Moratuwa, Sri Lanka. 25th-26th July 2019.
2. Bogahawaththa, P. B. M. R., Madhuranga, K. P., Baskaran K., & **Hidallana-Gamage, H. D.** (2020). Study on Concrete Filled Steel Circular and Square Tubes. *2020 Moratuwa Engineering Research Conference (MERCon)*, Moratuwa, Sri Lanka, pp. 42-47, doi: 10.1109/MERCon50084.2020.9185319.