APPLICATION OF EUROCODE 5 RECOMMENDATIONS TO THE BOLTED JOINTS OF SRI LANKAN TIMBER SPECIES

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by

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DECLARATION

I, Arawinda Dayanath Nawagamuwa, hereby declare that the content of the thesis is the original work carried out over a period of two and half (2 ½) years at the Department of Civil Engineering, University of Moratuwa. Whenever others' work is included in this thesis, it is appropriately acknowledged as a reference.

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SUMMARY

Eurocode 5 "Common Unified Rules for Timber Structures" is the latest structural design code, which provides guidelines for structural timber design. Eurocode 5 procedures for the design of bolted and nailed timber joints are based on an analytical model, which developed by Johansen in 1949. This model is often referred to as European Yield Model (EYM) and provides more reliable design procedure than older empirical models.

This thesis provides information of the research work, which was carried out at the University of Moratuwa to check the applicability of Eurocode 5 design procedure to bolted timber joints made from local timber species. The test programme was conducted using two local timber species and three bolt diameters, which are commonly used in the construction industry, with wider range of joint geometries while most of past research were conducted using only one or two joint geometries.

Based on the results obtained from this test programme, it was possible to propose a new model for the determination of embedment strength of local timber species and a modification factor, which is determined based on the joint geometry. This modification factor modifies the Eurocode 5 predictions for the strength of bolted timber joints of different geometry to reasonably acceptable conservative values.

Reasons and the methodology of this research programme are explained briefly in the first chapter while the second chapter describes, in detail, the background for this research programme. From the third chapter the reader is able to obtain much information on Eurocode 5 and European Yield Model, which are found from a thorough literature survey carried out on the available research papers, journals and textbooks. Scheduled experimental programme adopted according to the recommendations of previous research and guidelines obtained from the literature survey is provided in Chapter 4. Chapters 5 and 6 provide the results obtained from embedment strength test programme and joint strength test programme and the analysis of those results. Conclusions based on the analysis and recommendations for further works are provided in chapter 7.

CONTENTS