THE EFFECTS OF TAPERED SLEEVE IN IMPROVING THE ANCHORAGE BOND OF REINFORCEMENT BAR

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A project report submitted in partial fulfillment of the
requirements for the award of the degree of
Master of Engineering (Civil-Structure)

Faculty of Civil Engineering
Universiti Teknologi Malaysia

JANUARY 2013

To my beloved parents and siblings

ACKNOWLEDGEMENTS

Firstly, I would like to give a million thanks to my supervisors, Associate Professor Dr. Ahmad Baharuddin b. Abd. Rahman for his advice and guidance throughout the whole project. It was a pleasure to have the opportunity to work under his supervision where I have learned and gained a lot of knowledge.

I would also like to give my sincere appreciation to all the technicians who have been a helping hand during the project stages. Besides that, I would also like to give a giant thanks to all my friends who have been sharing their knowledge and opinions with me, not forgetting those who have been always supporting me during the completion of the project.

Last but not least, I want to express my gratitude to my family for their endless belief, encouragement, and great support for me in completing the whole project. Additionally, I would like to give thanks to those whose names I did not mentioned and have been giving me advice and support.

ABSTRACT

This research examine on the effectiveness of tapered sleeve connector in providing confinement effect to embedded reinforcement bar. The objectives of the investigation are to study the bond mechanism of grouted sleeve connector and to study the effects of confinement provided by the grouted sleeve connector. Two different configurations (welded bar sleeve and tapered sleeve) of sleeve connector were used in this study. Various sleeve diameters were used in this research to study their effects on the bond mechanism. The bond failure progression inside the grouted sleeve connector was observed visually as halved welded steel bar connector and tapered head connector were used. The experimental works consisted two phases where phase I was the testing of plain grouted sleeve. Phase II involved the testing steel fibre reinforced grout sleeve. Steel fibres of 0%, 0.5%, 0.75% and 1.0% were introduced to the connector in a way so the grout inside the connector will exhibit post-cracking behaviour. Pull-out tests were carried out and it was observed that the performance of tapered sleeve was better than welded bar sleeve due to higher confinement level. The provision of sufficient confinement stress able to delay the development of splitting cracks. The test result showed that welded bar sleeve was governed by splitting failure mode, whereas tapered sleeve failed in pull-out failure mode.

ABSTRAK

Kajian ini dijalankan untuk mengkaji kesan pengurungan oleh penyambung yang berbentuk tirus ke atas tetulang besi. Objektif kajian ini adalah untuk mengkaji mekanisma ikatan penyambung dan juga mengkaji kesan pengurungan oleh penyambung. Dua jenis konfigurasi penyambung digunakan dalam kajian ini iaitu penyambung berbentuk silinder dan penyambung berbentuk tirus. Diameter yang berlainan diagunakan dalam kajian ini untuk melihat kesannya ke atas mekanisma ikatan. Kegagalan ikatan yang berlaku dalam penyambung diperhatikan secara visual kerana penyambung yang digunakan dalam kajian ini adalah separuh daripada diameter penyambung. Eksperimen kajian ini terbahagi kepada dua fasa. Fasa pertama melibatkan ujian ke atas penyambung mengandungi 0% gentian besi. Fasa kedua melibatkan ujian ke atas penyambung mengandungi 0.5%, 0.75%, dan 1.0% gentian besi. Gentian besi ditambah ke grout dengan tujuan untuk memerhati jika penambahan gentian besi boleh melambatkan keretakan. Ujian *pull*-out dijalankan dan didapati bahawa prestasi penyambung berbentuk tirus lebih baik daripada penyambung berbentuk silinder kerana tahap tekanan pengurungan yang lebih tinggi. Tekanan pengurungan yang dikenakan oleh penyambung dapat melambatkan pembentukkan retak pecah-pisah. Keputusan Eksperimen menunjukkan bahawa mod kegagalan penyambung berbentuk silinder adalah mod retak pecah-pisah, manakala mod kegagalan bagi penyambung berbentuk tirus adalah kegagalan *pull-out.*