

**MODELING OF INTERFACE BONDING OF
BITUMINOUS PAVEMENT LAYERS FOR TROPICAL
CLIMATE**

Osanda Manupriya Muthuhewa

188034U

Degree of Master of Science

Department of Civil Engineering

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Thesis submitted in partial fulfillment of the requirements for the degree
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DECLARATION

“I declare that this is my own work and this thesis does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any other University or institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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Abstract

The bonding strength of bituminous layers is an element of paramount consequence, as it defines the structural performance of flexible pavement layers. Failure to establish the required strength will lead to the occurrence of pavement distresses.

This study was conducted in pursuance of the aims of identifying and further analyzing the significant parameters affecting interface bonding strength. Type of tack coat, application rate and residual application rate of tack coat, curing time, and surface macro-texture were determined as the parameters, upon the examination of past studies. Another parameter which had not been subjected to prior examination- the absorbed emulsion content was also discovered. Furthering the research, correlations of these parameters were studied based on field data and laboratory data.

Field data were collected from in situ tests, namely the sand patch test and test methods which estimate rate of application, and the absorbed emulsion content test, conducted on actual road construction projects, while laboratory data comprised of interface shear strength of pavement core samples which were evaluated through the Moratuwa Interface Shear Strength Tester (MISST): a device that had been designed in line with the research especially for the purpose of evaluating interface shear strength of pavement core samples.

Established on the observations, a final model capable of evaluating interface shear strength of bituminous pavement layers was developed based on application rate determined by geotextile pads and corrected absorbed emulsion content computed through a past study: significant parameters affecting interface shear strength. It was thus observed that interface shear strength increases when the application rate estimated by the geotextile pads decreases, and when the corrected absorbed emulsion content increases.

Key words: Interface shear strength, Surface macro-texture, Absorbed emulsion content, Application rate

DEDICATION

*I dedicate my thesis to my mother and father for nursing me with affection and love
and their dedicated partnership for the success in my life*

ACKNOWLEDGEMENT

First and foremost, I would like to express my cordial gratitude to my supervisor Prof.W.K.Mampearachchi for the continuous support, and motivation he readily gave me to accomplish this research on time. His patience in guiding me extremely well from the start to the very end of the days I worked on this thesis, are very much appreciated.

Besides my supervisor, I am also thankful towards my progress review committee: Dr. (Mrs.) Judith Samaranayake, Dr. H.R. Pasindu, Prof. A.A.D.A.J. Perera, and Prof. R.U. Halwathura for their insightful comments and encouragement to widen the scope of my research from various perspectives.

Also, I would like to thank Road Development authority, Sri Lanka, Keangnam Enterprises Ltd, CML-MTD Construction Ltd, Consulting Engineers & Contractors Pvt. Ltd, and China Harbour Engineering Company Ltd. for allowing me to conduct field tests and collect pavement core samples from their road development projects.

I wish to express my sincere thanks to Mr. Chandana who was the mechanic of MISST device for building the device as we expected. And, I am grateful towards Mr. Randil, Mr. Pethum, Mr. Uditha, Mr. Ishara, Mr. Tharshigan, Mr.Hasindu, Mr. Piyal, Mr. Yasas, Mr. Jayanga Mr. Buddhi, Mr. Dhanushka, Mr. Subhash, Mr.Amith, and the others who assisted me, and the laboratory staff of the Structural testing lab, for supporting me to carry out field tests and laboratory tests while dedicating their valuable time.

As well as, it is with gratitude I recall Prof. J.M.S.J. Bandara and Ms. Pabasari who supported me to conduct the analysis with accuracy. I would also like to thank Miss. Eshara for supporting me to get my research publications and the thesis proofread precisely.

I also express my sincere gratitude to the academic and nonacademic staff of Department of Civil Engineering, University of Moratuwa for the continuous support and guidance given throughout my undergraduate and postgraduate life. Furthermore, I thank my fellow research colleagues for the stimulating discussions, for all the

support to successfully complete my experimental work and the help given to accomplish this research without any stress.

My brother and cousin Ms. Kalani deserve my whole hearted thanks as well.

Last but not least, it is with a heart laden with gratitude that I call to mind my dearest parents, the greatest pillars in my life who were always there to lift me up during hard times, and give me all the support and love I could ever imagine of having, to be the person I am today.

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LIST OF ABBREVIATIONS

AC-XX	Bitumen (Viscosity grade)
AEC	Absorbed emulsion content
ARG	Application rate by geotextile pad
ART	Application rate by tray test
CMS-2	Cationic medium-setting, high viscous bitumen
CRS-1	Cationic rapid-setting, low viscous bitumen
CRS-2	Cationic rapid-setting, high viscous bitumen
ISS	Interface Shear Strength
MC-XX	Medium Curing, XX-Kinematic viscosity at 60C in centistokes
MISST	Moratuwa Interface Shear Strength Tester
CAE	New absorbed emulsion content
PG XX-YY	Performance Grade (PG), XX - average seven day maximum pavement design temperature, YY - minimum pavement design temperature
RAR	Residual application rate
RC-XX	Rapid Curing, XX-Kinematic viscosity at 60C in centistokes
SBS	Styrene–Butadiene–Styrene
SC-XX	Slow Curing, XX-Kinematic viscosity at 60C in centistokes
SMT	Surface macro-texture
SS-1	Anionic slow-setting, low viscous bitumen