

**MODELING A CYLINDRICAL RUBBER BLOCK OF  
TYRE TREAD COMPOUND FOR PREDICTING THE  
TEMPERATURE PROFILE UNDER HEATING  
CONDITION**

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of Science in Polymer Technology

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February 2019

## **DECLARATION OF THE CANDIDATE & SUPERVISOR**

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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The above candidate has carried out research for the Master's thesis dissertation under my supervision

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## ACKNOWLEDGEMENT

Throughout this research it had helped me a lot of people until it comes to this end. First, I would like to thank for the early guidance and advices, given by Mr.Hemantha Wattededara and Mr.Ruwan Weerasooriya in Technical centre of Camso Loadstart. Their guidance was the initial foundation of this study.

Then I would like to thank to my supervisor prof. Shantha Walpalage who gave a tremendous support and align me to the correct direction. His encouragement and support were one of the pillars which led me to complete the study. Moving from the industrial aspect, he always advised and guided me to move forward with scientifically approach.

Also, I would like to thank to prof. Jagath Premachandra who was the course coordinator of Master of Science in Polymer Technology degree. He always behind us to guide us to complete the researches.

During some of the activities of the research, several testings had been conducted in the analytical laboratory in Materials Sciences and Engineering department, University of Moratuwa. First I would like to thank to head of the department Mr.Sampath Weragoda for providing the permission to conduct the testing. Also, I would like to thank for Mr.Roshan Dodampola who was a instructor and to Dr.Shantha Amarasinghe who is senior lecturer in the same department for the support and guidance.

All the practical, software-based testing and modelling were conducted in Technical centre in Camso Loadstar (pvt) Ltd. I would like to thank to all the team in the Technical Centre for providing the support in each activity during this research.

Finally, if I have missed any name above, please accept my thanks for all the support and guidance.

## **ABSTRACT**

In the rubber industry, curing is very important parameter. There are many methodologies are used industrially in order to predict the optimum curing time of rubber product. The methodologies are mainly two types as practical and numerical approaches. In the practical approach, it is used a lot of manual activities to collect the temperature distribution within the rubber product. It is time consuming and non-economical method. Therefore, most of the industries are attempting to develop numerical models for the rubber curing. Nowadays the trend is to develop software-based numerical modellings to predict not only the temperature distribution but also state of cure of the rubber product.

In this research it was attempted to predict the temperature profile of cylindrical tread rubber block using a well-known software called Solidwork. The accuracy of the model was verified by practically measured data. In order to match practical temperature profile, with the modelled figures, the thermal properties were changed. Even though there are several thermal properties such as thermal conductivity and specific heat capacity, the critical thermal property is the thermal diffusivity.

Based on the results, the prediction of temperature profile with the default settings of the software and fixed thermal properties would not be possible.

Keywords : rubber compound, simulation model, thermal diffusivity

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## LIST OF ABBREVIATIONS

M <sub>L</sub>	Minimum Torque
M <sub>H</sub>	Maximum Torque
t <sub>c 90</sub>	Optimum Cure Time
C <sub>p</sub>	Specific Heat Capacity
DSC	Disc Scanning Calorimeter
DMA	Dynamic Mechanical Analyzer
t <sub>s2</sub>	Induction Time
MDR	Moving Die Rheometer
ODR	Oscillating Disc Rheometer