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

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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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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_L	Minimum Torque
M_H	Maximum Torque
tc_{90}	Optimum Cure Time
Cp	Specific Heat Capacity
DSC	Disc Scanning Calorimeter
DMA	Dynamic Mechanical Analyzer
t_{s2}	Induction Time
MDR	Moving Die Rheometer
ODR	Oscillating Disc Rheometer