

This MSc assignment is done in cooperation with BOGE Rubber & Plastics

Rubber is a viscoelastic material which is used in many different industrial applications. It is prepared in internal mixers where different ingredients are added to the rubber in order to reach the required final in-rubber properties of the industrial compound. The conditions which are reached after the mixing process are partly preserved in a vulcanization process where the individual rubber chains are crosslinked. The resulting in-rubber properties e.g. of a hydromount should be remain unchanged the whole lifetime of the rubber part.

It is known from the experience of the industry partner that some rubber compounds show an increase in the hardness during storage after the production process. Within this project, this ageing process will be investigated. The influence of different additives of the rubber formulation on the ageing behaviour will be evaluated. Furthermore, the geometry of the final industrial rubber compound will be considered as well.

### Objective

The goal of this assignment is to characterize the ageing behaviour of industrial rubber compounds.

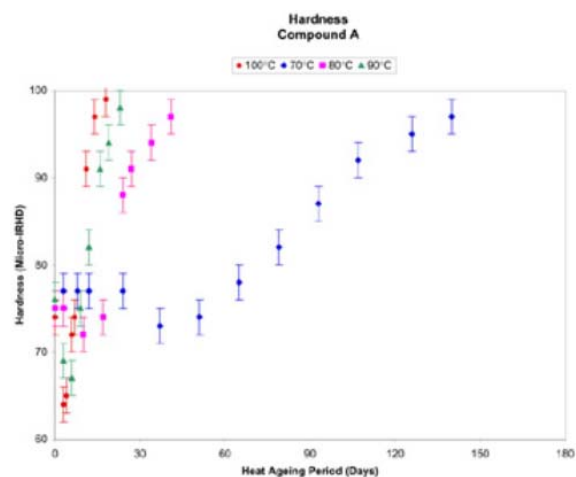
### Assignment

The graduate student will start with a literature search about the ageing behaviour of rubber compounds. Within the practical study, elastomer composites containing different additives (accelerator, anti-ageing additives) are prepared (model compounds and real industrial compounds) in the UT lab or in the lab of the industry partner Boge. An artificial ageing process at elevated temperature (50 °C) is used and compared with the ageing behaviour at room temperature. The rubber samples are characterized with different in-rubber properties before and after the ageing process. A correlation for predicting the ageing behaviour will be searched. It will be tested if a mathematical prediction of the ageing behaviour at room temperature is possible by using the data from an elevated temperature.

### Report

The graduation report comprises

- An overview of the ageing behaviour of rubber compounds, the mixing and vulcanisation technologies, and the related property profiles of the reinforced elastomers.
- The preparation of the elastomer composites.
- The in-rubber-data
- A correlation between the variation in the rubber formulation and the ageing process



*Ageing of Rubber: Accelerated Heat Ageing Test*  
(S. W. Hawley in: Engineering 360, reference library)



*Production of hydromounts (Kreiszeitung, September 17, 2014)*

### Partners

This project will be done in cooperation with BOGE Rubber & Plastics (Damme, Germany).

### Contact

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