

CO₂-BASED RUBBER COMPOUNDS SIGNIFICANTLY REDUCE CARBON FOOTPRINT

Polycomp B.V. develops, tests, and manufactures high performance rubber compounds for demanding applications in e.g. automotive, oil & gas, food & pharma, and chemical process industries. Main focus is on compounds based on FKM, FFKM, and HNBR, as well as specialties based on most of the other elastomers. Polycomp is based in Vorden, The Netherlands. Polycomp is having its own laboratory and pilot plant for product development, as well as modern production machinery.

Over the last years, elastomers have been proposed to integrate CO₂ as carbon feedstock. These CO₂-based rubbers are developed to substitute conventional rubbers in synthetic elastomer products. The elastomers produced this way have an unique chemical structure, and therefore are not a one to one replacement for existing fossil fuel based elastomers. However, its properties make that it can be a replacement for HNBR, NBR, EPDM and CR, depending on application. It now is a challenge, in cooperation with the manufacturer, to further develop compound mixing and processing technology to make the material a success.

Objective

The objective of this assignment is to identify and understand the structure-property relationship of the different grades, compare to existing rubber types, and be able to predict when it can be used as an alternative. Secondly, mixing technology at Polycomp should be developed, and guidelines for processing at customers.

Assignment

At the beginning of the assignment the student will start to understand the structure-property relationship. Compounds will be mixed at lab scale, and physical properties as well as chemical resistance will be tested. The results obtained will be discussed based on mechanisms, and will ultimately lead to a set of guidelines on the use of the elastomer. Scale-up of mixing at Polycomp will be studied. If time allows, tests at customers sites might be possible. Practical work will be performed at the laboratory of Polycomp, and optionally at the manufacturer, ETE and/or customers.

Report

The report should contain: **1.** Overview of property-structure relationship; **2.** Compare to existing rubber types; **3.** Processing guidelines (mixing and processing); **4.** Test results, their evaluation, discussion and conclusions.

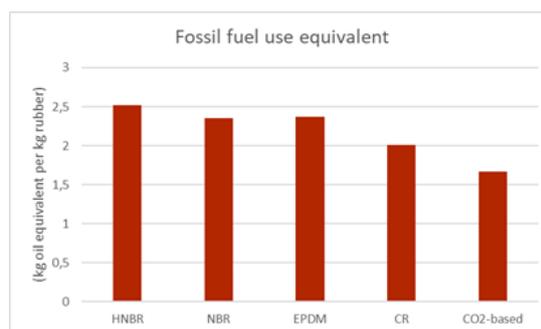


Fig. 1: Fossil fuel use equivalents of CO₂-based rubber compared to common rubber grades based on a LCA.

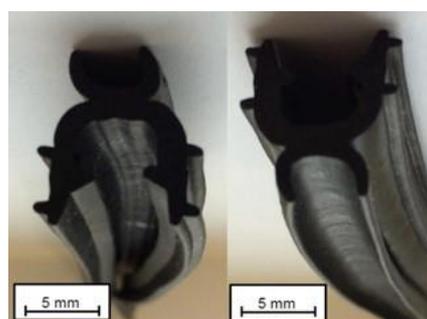


Fig. 2: Extruded profiles made with a CO₂-based rubber compound.

Partners

This project will be done in cooperation with Polycomp B.V., Handelsweg 7, 7251 JG Vorden. See www.polycomp.nl.

Contact

ETE: Wilma Dierkes
w.k.dierkes@utwente.nl
NH220