

MAGIC

Biobased alternative for sound- and vibration-reducing materials in railway fastening systems

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Background

Wageningen UR Food & Biobased Research is working on the development of environmentally-friendly resins for elastic rail fastening systems for railway track. Currently the resins for these systems are petroleum-based polyurethanes. In the MAGIC project, Wageningen UR is working with Dutch companies edilon)(sedra and Croda.

Objective

The goal of the project is to develop new resins from biomass which cure into an elastic rubber-like compound within a limited time. These biomass-based polymers can be applied as elastic noise- and vibration-reducing materials. Various chemical compounds are being studied. The final material should be less moisture-sensitive in processing and have a short curing time. In addition, it must meet specific mechanical material requirements and adhere well to rails and concrete. The tangible end product of the project is a prototype of the rail fastening system made with the bio-based two-component resin.

Approach

Several potential alternative chemical research routes are being evaluated. The influences of molecular structure, catalysts and other additives, fillers, ratio of reactants, and curing conditions on elastomer formation and final elastomer performance are being studied and compared to the currently used polyurethane elastomers.



Figure 1. Example of a sustainable edilon)(sedra product application, reducing rail wear in curved tracks.



Figure 2. Example of a rail track embedded in noise & vibration dampening elastomer.

Croda's oleochemical building blocks are used to provide elastomers with the required flexibility and water resistance. The oleochemicals are combined with other reactives derived from e.g. carbohydrates or lignin.

A sustainability analysis will be performed to assess the environmental performance of the newly developed material.

Project partners

• edilon)(sedra

For more than 35 years, edilon)(sedra is active in the development, production, engineering and installation of special railway fastening systems and noise & vibration dampening products.

• Croda Netherlands BV

Croda Netherlands produces speciality products derived from natural oils and fatty acids for a variety of markets, such as polymers, coatings and adhesives. Important building blocks for the Croda product portfolio are dimerised fatty acids, diols and diamines.

• Wageningen UR Food & Biobased Research

Wageningen UR Food & Biobased Research has a long track record in modifying renewables such as carbohydrates, proteins and vegetable oils and fatty acids, in order to develop systems for resins, coatings, adhesives and plastics.

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