Development of biocomposites from denim waste and thermoset bio-resins for structural applications

Robin Temmink, Behnaz Baghaei, Mikael Skrifvars

PII: S1359-835X(17)30445-1
DOI: https://doi.org/10.1016/j.compositesa.2017.12.011
Reference: JCOMA 4860

To appear in: *Composites: Part A*

Received Date: 9 August 2017
Revised Date: 21 November 2017
Accepted Date: 11 December 2017

Please cite this article as: Temmink, R., Baghaei, B., Skrifvars, M., Development of biocomposites from denim waste and thermoset bio-resins for structural applications, *Composites: Part A* (2017), doi: https://doi.org/10.1016/j.compositesa.2017.12.011

Development of biocomposites from denim waste and thermoset bio-resins for structural applications

Robin Temmink, Behnaz Baghaei*, Mikael Skrifvars
Department of Textile Technology, Faculty of Textiles, Engineering, and Business,
University of Borås, SE-501 90 Borås, Sweden

* Correspondence to Behnaz Baghaei, Tel: +46 33 435 5904
E-mail address: behnaz.baghaei@hb.se

Abstract

This paper examines the use of post-consumer denim fabric in combination with thermoset bio-resins in composite manufacturing for structural applications. Bio-epoxy and acrylated epoxidized soybean oil resin (AESO) were used as bio-resins with four different manufacturing techniques in order to create a wide scope of possibilities for research. The four techniques are: compression moulding (COM), vacuum infusion (VAC), resin transfer moulding (RTM) and hand lay-up (HND). The bio-resins were compared to a conventional polyester resin, as this is highly used for structural applications. To determine suitability for structural applications, the biocomposites were tested for their mechanical and thermal properties. Fabricated composites were characterised regarding porosity, water absorption and analysed through microscopic images of the composite. Results show both bio-epoxy and AESO are suitable for use in structural applications over a range of manufacturing techniques. Furthermore, biocomposites from bio-epoxy are superior to those from AESO resin. The conventional polyester has shown to be unsuitable for structural applications.

Keywords:
A. Biocomposites
A. Recycling
B. Mechanical properties
E. Resin transfer moulding