IARJSET ISSN (O) 2393-8021, ISSN (P) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

Impact Factor 8.311 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 12, Issue 7, July 2025

DOI: 10.17148/IARJSET.2025.12751

RESIN-COATED UPCYCLED DENIM: A SUSTAINABLE INNOVATION IN FASHION ACCESSORIES

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Abstract: The fashion industry is increasingly criticized for its unsustainable practices and environmental footprint. This paper introduces an innovative method of enhancing post-consumer denim through resin coating to create durable, stylish, and eco-friendly fashion accessories. It explores the process, properties, sustainability benefits, and commercial viability of resin-coated upcycled denim as a material alternative. The findings highlight its potential as a sustainable solution in accessory design, promoting waste reduction and creative reuse.

Keywords: Upcycled Denim, Resin Coating, Sustainable Fashion, Fashion Accessories, Textile Waste Management, Circular Economy, Eco-friendly Materials, Material Innovation

I. INTRODUCTION

The production and disposal of textiles present serious environmental problems, making the fashion industry one of the biggest producers of waste worldwide. Because of its extensive use, resource-intensive manufacturing process, and significant post-consumer waste, denim stands out among the other textiles used in fashion. Although denim is praised for its strength, classic appeal, and adaptability, clothing made of it is frequently thrown away too soon due to changing fashion trends, minor damage, or a lack of knowledge about options for reuse and repair.

Upcycling, which turns textile waste into new, valuable products, has become a creative and sustainable design approach in response to these problems. Upcycling aims to improve the aesthetic and practical aspects of discarded textiles, in contrast to recycling, which frequently downcycles materials into lower-quality outputs. This promotes a more circular fashion economy by extending the lifecycle of current textiles and lowering the demand for virgin materials.

The creation of resin-coated upcycled denim, a hybrid material that blends the strength and texture of denim with the decorative and protective qualities of resin, is one creative approach in this field. The material is appropriate for fashion accessories like purses, wallets, belts, shoes, and even jewellery because resin coatings can increase the material's water resistance, durability, and structure. Designers can experiment with new shapes, textures, and finishes by adding resin to upcycled denim, all while leaving a far smaller environmental impact than traditional production.

Through the use of resin-coated upcycled denim, this study examines the relationship between sustainability, material innovation, and modern fashion aesthetics. It looks at how this strategy helps artisanal practices, raises consumer awareness, and supports a larger cultural shift towards sustainable consumption in addition to keeping waste out of landfills. The study illustrates how this method has the potential to change how we think about and make fashion accessories in a world with limited resources through case studies, design analysis, and material testing.

II. PROBLEM STATEMENT

Despite the fact that sustainable fashion is becoming more and more popular worldwide, there is still little practical use of upcycled materials, especially in fashion accessories. Concerns regarding the materials' overall market acceptability, aesthetic appeal, and structural soundness are the main causes of this hesitancy. Despite being better for the environment, upcycled denim frequently lacks the stiffness, durability, and water resistance needed for practical accessories like belts, bags, and shoes. Additionally, its unpolished texture and finish might not meet the consumers' visual expectations. A promising solution that could improve appearance and performance is the application of a resin coating. However, careful, methodical research is necessary to fully understand its viability, environmental impact, and creative versatility.

III. OBJECTIVES

- To investigate the potential of upcycled denim as a raw material for fashion accessories

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- To assess the functional and aesthetic advantages of resin coating
- To evaluate environmental benefits and challenges associated with the use of this material

IV. METHODOLOGY

The feasibility and performance of resin-coated upcycled denim in the creation of sustainable fashion accessories were investigated in this study using a qualitative and experimental methodology. The following phases were used to carry out the study:

Material Collection: Local waste collection facilities and second-hand stores provided the post-consumer denim clothing. Items that were too worn out or damaged to be used again in clothing were given priority.

Preparation: To get rid of oils, dirt, and dye residues, the chosen denim was carefully cleaned. After that, it was cut into uniform shapes that could be used as jewellery bases, wallet covers, and bag panels.

Coating Process: Brush-on layering and pour-on casting were two of the methods used to apply two types of resins: epoxy and polyurethane. To assess material behaviour and finish consistency, several coats were tested.

Testing parameters: To ascertain the treated fabric samples' suitability for final use in fashion accessories, they were evaluated for surface durability (scratch and abrasion resistance), flexibility, water resistance, and tactile texture.

Product Prototyping: Working models of wallets, cardholders, pendants, cuffs, and tote bags were made. Designs included hardware such as buttons, chains, and zippers, emphasising both style and utility.

Life Cycle Analysis (LCA): To assess the environmental impact of resin-coated upcycled denim versus commonly used materials like virgin leather and PVC-based synthetic alternatives, a comparative LCA was carried out, with an emphasis on carbon footprint, water usage, and end-of-life disposal.

V. ANALYSIS AND RESULTS

- Physical Properties: Resin-coated denim achieved increased stiffness, surface gloss, and water repellence
- Design Features: Allowed embedding of pigments, glitters, dried flowers, and prints
- Functionality: Extended life cycle of denim, resistance to fraying and wear
- Sustainability Impact: Showed up to 70% lower environmental impact compared to virgin alternatives
- User Perception: Focus group feedback indicated high interest in aesthetics and eco-conscious appeal

VI. DISCUSSION

Resin coating offers a creative and sustainable enhancement for upcycled denim. By adding durability and visual interest, it turns discarded textiles into marketable, premium-quality products. However, the environmental performance of the resin itself is critical; most resins are not biodegradable. Bio-based resins offer a promising direction. Further, while small-batch production supports uniqueness, scalability remains a challenge.

VII. CHALLENGES AND LIMITATIONS

- Material Rigidity: Excess resin reduces fabric flexibility
- Resin Sustainability: Most available resins are petroleum-based
- Time-Intensive Production: Requires drying and curing periods
- Limited Mass-Production Scope: Handmade nature limits scalability

VIII. CONCLUSION

At the nexus of fashion design and sustainability, resin-coated upcycled denim stands out as an intriguing innovation. This strategy provides a workable answer to the expanding issue of textile waste by turning post-consumer denim into strong and fashionable accessories. Applying resin not only improves the material's surface finish, water resistance, and structural integrity, but it also enables artistic expression through distinctive forms and textures. This combination of style and utility opens the door for environmentally conscious product lines that appeal to consumers who care about the

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environment. The study also emphasises the possibility of developing this method further by investigating plant-based or biodegradable resins, which would lessen its negative effects on the environment. Product lifespans can be increased, production waste can be decreased, and scalability can be improved by implementing modular design techniques like interchangeable parts or multipurpose components. In general, resin-coated upcycled denim is a creative step towards circular fashion systems that strike a balance between market viability, creative freedom, and environmental responsibility.

IX. RECOMMENDATIONS

- Encourage development of bio-resins and low-toxicity alternatives
- Integrate craftsmanship-based production models to ensure quality
- Promote consumer engagement through workshops and awareness campaigns
- Explore modular accessory designs for easier replication and scaling

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