

Acoustic Art Panels:

→ **Material Driven Visions
of Textile Waste**

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CIRCULAR DESIGN

TEXTILE WASTE

ACOUSTICS

RECYCLED TEXTILES

MATERIAL DRIVEN DESIGN

Introduction

This article draws upon my experience and reflections from my Master's thesis 'Circular Visions of Textile Waste' (Norris 2020) whilst on the Design for Planet Masters programme at Designskolen Kolding (DSKD) in 2020, and its continuation as an artistic development project carried out at DSKD 2020-21.

In my pursuit of studying, I sought to understand how I could reapply skills from my previous BA studies in fine art and career in set design towards positive change in society. I first believed this was at the expense of what had characterised my work, namely the bright, bold aesthetics and a well-formed trust in my creative intuition. This misconception of design for sustainability was based on finding scarce evidence of products and projects championing the aforementioned qualities, and seeing validity placed predominantly in scientific or quantifiable solutions to the field - an observation that eventually defined the imperative to spearhead my practice on artistic grounds.

Studying in an interdisciplinary, academic environment allowed me the freedom to evolve a hybridised practice that could move beyond and no longer be defined by the boundaries of my specialism in textile. This proved to be a necessary approach whilst navigating the ‘green transition’ of my practice, and encouraged me to put into practice the challenging nature of working towards sustainability through design.

This article presents the culmination of my studies through describing the process and outcomes of ‘Circular Visions of Textile Waste’, in which I developed the Acoustic Art Panels product concept – sound absorbing installations applying recycled textiles. The project involves myself, an interdisciplinary designer specialising in sustainability, and my collaboration partner Kvadrat Really (<https://www.kvadrat.dk/en/really>), a Danish company developing new recycled materials from textile waste. Taking focus on Acoustic Textile Felt (ATF), a material produced by Really, my ambition was to support utilising recycled textile fibres within a Circular Economy (CE). Furthermore, based on insights from the project, the text seeks to unfold my perspective on the need to exercise unconventional designer roles in commercial settings to understand their potential for impact in the green transition.

Fig 1. Acoustic Art Panel concept prototype, Material Driven Visions of Textile Waste, Masters Project, Designskolen Kolding, 2020. Photography: Greta Megelaite.



Fig 2. Acoustic Art Panel product installation, Material Driven Visions of Textile Waste, Artistic Research Project, Designskolen Kolding, 2021. Photography: Greta Megelaite.



Acoustic Textile Felt and Really Cph.

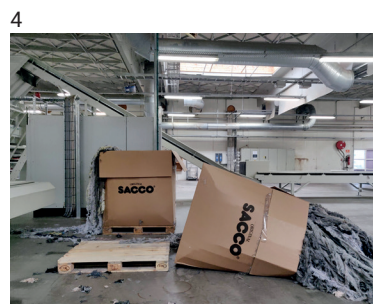
Kvadrat Really specialises in producing premium quality recycled material from textile waste. Their material, Acoustic Textile Felt (ATF), is produced through the mechanical recycling of textile waste, into a sheet of densely compressed fibres. This process follows the shredding of textile into a fine granulate, which is mixed with bonding fibres to form a non-woven mat before compressing it into the finished sheet material.

The development of ATF by Kvadrat Really (<https://www.kvadrat.dk/en/really>) has led to a highly engineered material, promoted for its aesthetic finish and sound absorbing qualities bringing high value to recycled textile waste. However, during an initial conversation with the production manager at Really, it was highlighted that their customers and clients were specifically challenged to understand ways of applying ATF, ultimately affecting its wider use and acceptance. Therefore, as part of my MA thesis in partnership with Really, I focused on exploring the design potential of ATF with the aim of influencing its uptake within new interior products. However, observations and findings from my investigations are relevant beyond this, and can be transferred to the wider perspective of new recycled materials.

Fig 3 - 5 Site visit to production facility Convert, Thisted, 2020.

Fig 4. Boxes of textile production offcuts from Kvadrat ready for recycling.

Fig 5. Stack of finished Acoustic Textile Felt sheets.



1.1

Recycled Materials and the Circular Economy

At the beginning of the project, I formulated two questions based on the conversation with the production manager at Really and preliminary research on routes for textile recycling: Without clear uses or applications for new recycled materials, does the process of recycling simply transform waste for 'sustainable credentials'? How might we instead connect novel recycled materials to the right contexts and interactions, to develop design concepts for their unique properties or develop their unique properties for design concepts?

It was through this line of questioning that I opened my exploration of ATF with the ambition to develop concepts for desirable, purpose-driven design products with an extensive lifespan that could support a Circular Economy (CE). Furthermore, the aim was to incentivise limited movement of textile waste within circular material cycles for its management as a valuable resource.

Kirchherr et al. (2017) define the CE as an economic system that replaces the 'end-of-life' concept with reducing, alternatively reusing, recycling and recovering materials in production/distribution and consumption processes, with the aim to accomplish sustainable development. The context of 'Circular Visions of Textile Waste', operates at a micro level of the CE consisting of products, companies and consumers, whilst taking a focus on recycling as a result of the partnership with Really and specialism in ATF. With this framing in mind, the project was carried out to meet core principles and aims of the CE, and understand ways in which creative design practice can contribute to enabling a CE for textiles. Drawing upon my hybridised practice that applies tools, methods and mindsets spanning artistic and design processes, Circular Visions of Textile Waste investigates the potential in qualitative aspects of enabling the CE - the conceptual, sensorial and experiential - that can bring the vision of a larger system or strategy to life. Without relying on the buzzword of circularity or methods of green-washing to promote recycled materials and products, these need to offer high value products based on functionality and beauty to exist alongside a market of virgin counterparts.

1.2 Methods and overview of the project

The Master's thesis involved a number of phases including: Research on routes for textile waste within a circular material system; Setting up the collaboration with recycled material producer Really; forming design directions for ATF; and Developing the product concept: Acoustic Art Panels, sound absorbing artistic installations. This was followed by the Artistic Research project initiating product development of the Acoustic Art Panels concept applying ATF, with a focus on enhancing the acoustic functionality and influence of colour within design aesthetics.

My research was practice based and its physical outcomes make up the core work of the project, that was approached through creative design methods (Schön 1983) such as - sketching, collaging, reflective dialogues and rapid prototyping. Furthermore, I was inspired by Material Driven Design (MDD) that encourages tangible interaction with the material and supports designers in structuring, communicating, and reflecting on their actions in design for material experiences (Karana et al. 2015). Approaching the project through MDD I investigated my role as designer by:

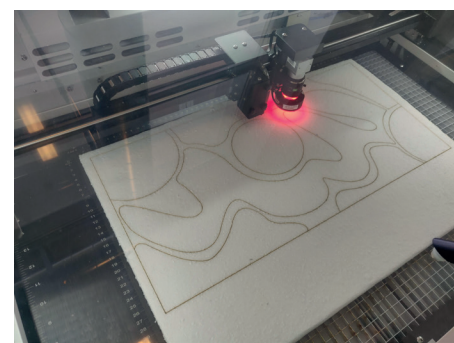
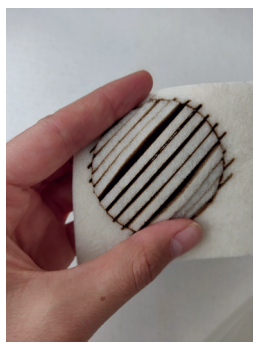
1. Exploring unique technical and experiential qualities of working with ATF
2. Developing new application and product opportunities for ATF via creative design and sustainable design principles

These two investigation objectives also formed the two phases of the project: the first defined by my MA thesis; and the second describing its continuation as an artistic development project in the research department Lab for Sustainability and Design at DSKD. Observations and findings cross over both phases of the project to inform the content of this article, generating data consisting of email communications, audio recordings, videos, images and field notes from my personal process, site visits, focus groups, meetings, and interviews, along with discussion and the unfolding of personal and industry insights described in the following sections.

1.3

Example 1, Future Fashion, Design for Change

The technical and experiential exploration of ATF took a simultaneous approach, pairing different tools and techniques based on what was practically feasible and aesthetically interesting to create mutual nurturing between these ways of working. Key stages in this phase were cutting and shaping the material, to understand expressive possibilities afforded by different methods, developing a 'library of shapes' to work with throughout the sampling process creating a visual language for the material.

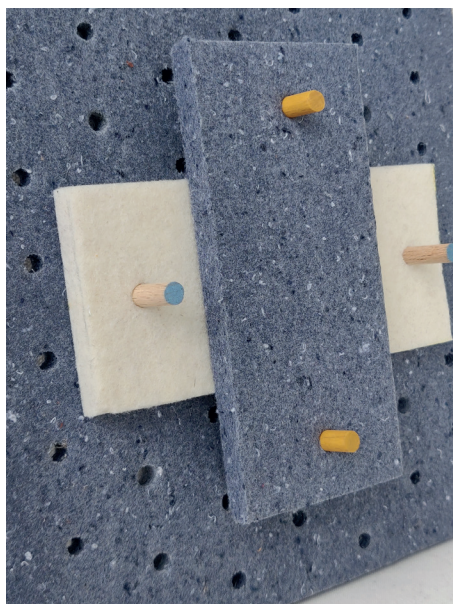


A Material Experience Vision was formulated around sustainable design methods not just as technical guidelines, but also as strategies that contribute to the aesthetic identity and concept of working with ATF to inform the prototyping phase. Designing for disassembly took a central focus for the repair, reuse and recycling of products, alongside leading an exploration into product customisation, to allow for user involvement and creative expression through experimenting with shape and pattern. Desirability testing with focus groups was conducted throughout this stage for feedback and further development of samples.

Fig 6. Testing manual cutting tools.

Fig 7. Early laser cutting sample.

Fig 8. Experimenting with shape and pattern using the laser cutter.



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Figs 9 - 10. Prototyping applications and concepts around working with ATF.

Fig 9. Layering felt and working with wooden dowels.

Fig 10. Applying ATF shapes on wooden board.

Fig 11 & 12. Experimenting with ATF shape compositions.

The Acoustic Art Panels product concept was developed based on applying ATF within customisable artistic installations. Placing a dual focus on aesthetics and function, the panels bring a creative, dynamic energy to creating a balanced acoustic atmosphere, demonstrating the principles of aesthetic and product longevity in applying ATF. At this stage, the prototypes centred on creative methods of applying the material, through offering a selection of ATF shapes with the possibility to arrange and adapt their composition through the use of reversible fixings to a base of plywood.

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Figs 13-18. Acoustic Art Panels concept prototypes.

Fig 13. Customisable composition of ATF shapes applied on perforated plywood backboard using reversible dowel fixings.

Fig 14. Customisable composition of ATF shapes applied on ATF sheet and painted plywood backboard using reversible pin fixings.

Fig 15. ATF off-cut piece applied on ATF sheet using reversible pin fixings.

Fig 16. Single ATF shape applied on painted plywood backboard using reversible dowel fixings.

Fig 17. Customisable composition of ATF shapes applied on painted and perforated plywood backboard using reversible dowel fixings.

Fig 18. Single ATF shape applied on painted plywood backboard using reversible dowel fixings.

1.4 Phase 2: Developing new application and product opportunities for ATF via creative design and sustainable design principles

Product development of the Acoustic Art Panels first addressed the acoustic functionality of designs. This resulted in the set up of a collaboration with the Acoustic Engineering department at DTU, involving a series of meetings and discussions during which technical knowledge and feedback was given in response to the development of new prototypes for optimal sound absorbency. This process navigated the relationship between design features and their potential for acoustic performance, with variables of the ATF (depth, coverage) and plywood base (dimensions, air gap, % of perforation, hole diameter), iteratively tested through a digital simulation programme working towards set values for the final design.

Fig 19 & 20. Prototyping designs for increased sound absorbency



Setting the framing and limitations around developing a final Acoustic Art Panel design was important to establish moving forward. Therefore, based on user insights that heavily responded to the use of colour within prototypes, I focussed on incorporating this as a customisable factor on the plywood elements. With the colours of ATF – grey and white - limited due to the waste sources available, I sought to emphasise the influence of colour in offering endless ways of experiencing the material within the design of the product. This led to conducting exercises in colour theory observing the relationship between individual colour samples and ATF to curate a selected palette for the plywood framing the material, a process which was directly translated into the final design and installation.

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Figs 22 - 23. Prototyping pairing ATF with colour.

Fig 22. Exploring ATF in combination with different colour samples.

Fig 23. Mixing linseed oil paints and applying to plywood samples.

Fig 24. Early prototype of Acoustic Art Panel design.



Figs 24 - 25. Final Acoustic Art Panel design and installation.

Fig 24. Stacked Acoustic Art Panels.

Fig 25. Acoustic Art Panel installation, Designskolen Kolding 2021.

Reflections and Perspectives

Through the Acoustic Art Panels project, I was able to explore creative design practice and methods around working with materials for sustainable design. Applying the MDD method enabled me to build knowledge when working with a newly developed, unfamiliar recycled material such as Acoustic Textile Felt around areas such as aesthetics in relation to enhancing product functionality, customisation, and user interactions, as well as embodying sustainable values through product design.

In addition to this, working in collaboration with Really and focussing on supporting a CE for textiles, I was in the position to frame my work within a wider dynamic whole. Therefore, an added ambition became to translate the knowledge produced into strategies for new business and systemic perspectives. During the project I recognised that these elements ultimately play a significant role in the integration of recycled materials. However, I found it challenging to share and spread this knowledge to the company, which mainly seemed interested in design research for normative products, despite my efforts to develop ways of contributing to systems change. Working with materials for sustainable design requires a multidisciplinary and collaborative process. Though, sharing knowledge across different stakeholders with diverse interests within such processes can meet boundaries. Designers can be seen to have boundary spanning capabilities in multidisciplinary teams, through the practice of continually translating choices to the realm of products or users through expressive representations to be understood by all and enable reflection. As a result of the MDD method, the production of material samples and prototypes proved effective as tools for boundary spanning to share progress with Really. Communication based on tangible interactions developed naturally around these, through touching, handling and demonstrating, to create shared visions for how Acoustic Textile Felt could be applied and experienced in eventual products. Although this had its limitations, when I sought to facilitate dialogues with Really zooming out to the level of products as part of a wider system. Shared vocabulary is important for collaboration, and here I felt a demarcation from being unpracticed in translating my practice through business language and scenarios to enable Really to speculate beyond their

current circumstances and consider new proposals through samples and prototypes of the Acoustic Art Panels product concept.

At present, most products are designed for incomplete systems that do not account for their future. Therefore, in response to design for sustainability designers must be aware of and understand their role within a system, as well as being able to operate at a product level within it. Design tools and methods such as MDD, need to involve the bigger picture relating to business strategies and systems thinking for addressing sustainability and industry collaboration. I found this required to better facilitate boundary spanning for transforming new practice-based knowledge into the potential for new business models and systemic perspectives. Whereas the reality is that even methods and tools specialising in circular or sustainable product design disregard these perspectives and predominantly focus on technical criteria. I believe that a more structured communication with focus on finding a shared language and goals between different stakeholders, can help span the challenging boundaries and the way towards green transitions.

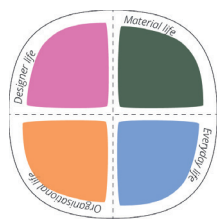
Reflections and Perspectives

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The Creative Language of Textile Waste

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