Rag Papermaking and Textile Recycling

Dr. Daphne Mohajer va Pesaran

Mason Family Trust Fellowship, 2024

International Specialised Skills Institute

MASON FAMILY TRUST

managed by Equity Trustees

First Published 2024

Report by Dr. Daphne Mohajer va Pesaran
Typeset by Danielle Cull
Printed by MDM Copy Centre

The International Specialised Skills Institute

1/189 Faraday St,
Carlton VIC 3053
info@issinstitute.org.au
+61 03 9347 4583

ISBN: 978-1-923027-65-7

Table of contents

01 Acknowledgements

The Awarding Bodies

The Fellow sincerely thanks the Mason Family Trust for providing funding support for the ISS Institute and for this Fellowship. Further, the Fellow acknowledges the support of RMIT University in relation to work flexibility and the ability to work while doing fieldwork. The Fellow also kindly thanks those who generously offered their time and opened their doors to her during the fellowship period and her partner, who patiently accompanied her on herjourney.

The ISS Institute plays a pivotal role in creating value and opportunity, encouraging new thinking and early adoption of ideas and practice by investing in individuals. The overarching aim of the ISS Institute is to support the development of a 'Better Skilled Australia'. The Institute does this via the provision of Fellowships that allow Australians to undertake international skills development and applied research that will positively impact Australian industry and the broader community.

The ISS Institute was founded in 1991 by a small group of innovators, including Sir James Gobbo AC, CVO, QC, and former Governor of Victoria, who had a vision of building a community of industry specialists who would lead the up skilling of the Australian workforce.

The Fellowship program builds shared learning, leadership, and innovation across the broad range of industry sectors worked with. Fellows are supported to disseminate learning and ideas, facilitate change and advocate for best practices by sharing their Fellowship learnings with peers, colleagues, government, industry, and community. Since its establishment, ISS Institute has supported over 580 Fellows to undertake skill and knowledge enhancement across a wide range of sectors which has led to positive change, the adoption of best practice approaches and new ways of working in Australia.

The Fellowship programs are led by our partners and designed to achieve the needs and goals desired by the partners. ISS Institute works closely to develop a Fellowship program that meets key industry priorities, thus ensuring that the investment will have a lasting impact.

For further information on ISS Institute Fellows, refer to www.issinstitute.org.au

Governance and Management

- **Patron in Chief:** Lady Primrose Potter AC
- **Patrons:** Mr Tony Schiavello AO, Mr James MacKenzie and Mark Kerr
- **Founder:** Sir James Gobbo AC, CVO
- **Board Chair:** Professor Amalia Di Iorio AM
- **Board Treasurer:** Adrian Capogreco
- **Board Secretary:** Alisia Romanin
- **Board Members:** Jeremy Gobbo KC and Vicki Abraham
- **Chief Executive Officer:** Dr Katrina Jojkity

Fellow's Acknowledgements

The Fellow sincerely thanks the Mason Family Trust for providing funding support for the ISS Institute and for this Fellowship. Further, the Fellow acknowledges the support of RMIT University in relation to work flexibility and the ability to work while doing fieldwork. The Fellow also kindly thanks those who generously offered their time and opened their doors to her during the fellowship period and her partner, who patiently accompanied her on her journey.

02
Executive summary

Background

Dr. Daphne Mohajer va Pesaran, a lecturer and Program Manager at RMIT University, received the Mason Family Trust research fellowship to explore the traditional craft of rag papermaking in Europe. This fellowship, supported by the ISS Institute, aims to enhance Australia's skills and knowledge base by facilitating international research and development. Dr. Mohajer va Pesaran's expertise lies in sustainable fashion practices and historical uses of paper in design.

During the fellowship, she travelled to the UK and Athens, Greece to learn traditional rag papermaking techniques, study community-based textile recycling practices, and investigate historical applications of paper in everyday objects. This research addresses the critical issue of textile waste, driven by the global fast fashion industry, and aims to promote sustainable alternatives in the Australian fashion supply chain.

Fellowship Learnings

Dr. Mohajer va Pesaran's fieldwork included visits to several sites, such as FibreLab and Yodomo in London, Two Rivers Paper in Somerset, The Paper Foundation in Kendal, the ATOPOS paper clothing archive in Athens, and the Schmoller Collection Collection of Decorated Papers at Manchester Metropolitan University Special Collections Museum. She acquired essential skills and knowledge in producing viable rag pulp, crafting paper sheets, and integrating these techniques into contemporary design contexts.

Her research highlights the potential of rag papermaking as a sustainable practice that can mitigate the environmental impact of textile waste. By combining traditional methods with modern applications, she seeks to create innovative solutions for the circular economy in the fashion and textiles industry.

Personal, Professional, and Sectoral Impact

The fellowship has had a profound impact on Dr. Mohajer va Pesaran personally and professionally. It has expanded her knowledge and skill set, enabling her to contribute significantly to the fields of sustainable fashion and papermaking. Professionally, she plans to integrate her findings into her academic work at RMIT University and her design practice with DNJ Paper.

On a sectoral level, her research has the potential to influence the Australian fashion and textiles industry by introducing sustainable practices and promoting the use of recycled materials. Her work supports the broader goals of the ISS Institute by advocating for best practices and fostering innovation across the industry.

Considerations / Recommendations

To maximize the fellowship's impact, Dr. Mohajer va Pesaran recommends the following actions that will reduce fashion and textile waste and support the use of any waste produced:

1. **Dissemination of Knowledge:** Share the findings through workshops, seminars, and publications to educate peers, colleagues, and industry stakeholders about the benefits of rag papermaking techniques and textile recycling.
2. **Collaboration with Industry:** Partner with textile recyclers, designers, and manufacturers to develop scalable solutions for integrating recycled materials into fashion and design.
3. **Promotion of Sustainable Practices:** Advocate for policies and initiatives that support sustainable practices in the fashion industry, emphasizing the importance of reducing textile waste and promoting circular design principles.
4. **Educational Integration:** Incorporate the research findings into academic curricula to train future designers and industry professionals in sustainable practices and innovative material usage.

By implementing these recommendations, Dr. Mohajer va Pesaran aims to create a lasting impact on the industry, fostering a more circular approach to fashion and textiles.

03
Fellowship Background

The Fellow

Mason Family Trust research Fellow Dr Daphne Mohajer va Pesaran is a lecturer and Program Manager in the School of Fashion and Textiles at RMIT University in Melbourne, Australia. In tandem with her work as an academic, she is a fashion and textiles designer, and expert in sustainable fashion practices and the historical contexts and uses of paper for design. She investigates the use of paper for everyday life in collaboration with Jake Nakashima-Edwards, under the collective title of DNJ Paper (www.dnj-paper.com, @dnj_paper).

Supported by this fellowship, she travelled to Europe to acquire skills and knowledge in the art of rag papermaking and the use of paper for everyday objects such as clothing and interiors. With these new skills Daphne aims to contribute to the growing field of textile circularity in two ways: first by creating a positive impact on both the Australian papermaking and wider community, responding to the problem of overconsumption in the Australian fashion supply chain. And second, as the traditional methods of rag papermaking are disappearing in Australia, preserving the art and promoting its sustainable usage by considering how it can be applied to contemporary contexts.

During her fellowship, Daphne acquired traditional rag papermaking skills, knowledge related to community-based textile recycling practices and examined archival design precedents for the use of paper in everyday life. She plans to disseminate actionable knowledge based on her research in the field to contribute to solutions to the waste produced by fashion overconsumption.

The Problem

Australians are the highest consumers of textiles per capita in the world[1], but the overconsumption of fashion is a global problem, exacerbated by the fast fashion system. As a result, a staggering amount of fashion items are discarded as waste, with much of it ending up in landfills far distanced from the country of production or purchase. A 2022 report launched by the Australian Fashion Council (AFC) has revealed Australian individuals buy almost 15kg of clothes or 56 new items every year, and there are 1.42 billion pieces of clothing arriving in Australia each year, amounting to 373,000 tonnes of fabric.

Consumer behaviour supported by low cost per piece, as well as accessibility to new items is the cause of roughly 300,000 tonnes of clothing either being sent to landfill or exported from Australia every year[2]. A lack of awareness about the lifecycle of a garment,

1 According to a 2024 report by the Australia Institute Australians buy an average of 56 new clothing items a year, more than the US (53 items), UK (33 items) and China (30 items). It is important to note that Australia's population (26.01 Mil) is less than half of the UK (66.97 Mil) and far less than that of the US (333.3 Mil) or China (1.4 Bil), so the per capita purchase rate may have a lower impact overall than these other countries.

2 According to an Australia Institute discussion paper: https://australiainstitute.org.au/wp-content/uploads/2024/05/The-Australia-Institute-Textiles-Waste-In-Australia-Web.pdf

coupled with lack of knowledge of repair and care could also be contributing factors. The annual cost to consumers for clothing in 2021 was $9.2bn, with Australians paying an average of just $6.50 for each item of clothing. This cheap price creates a throwaway mindset, leading to the massive amount of textile waste generated every year. Consumers hold a belief that they can simply donate disused clothing to Opportunity Shops, but only 10% of this donated clothing makes it to the retail floor[3]. The rest ends up with textile recyclers. Garments also travel overseas to end up in markets such as the Kantamanto market in Ghana, or simply in a landfill such as that found in the Atacama desert in Chile. On their way to landfill, some items get recycled to make new fibres[4], yarns, and fabrics[5], but some garments get turned into rags for the automotive or DIY industries (though these eventually end up in landfill). The problem is exacerbated because though there are textile recyclers, there are no practitioners or factories in Victoria working at a medium- or large-scale enterprise to recycle the unwanted clothing into rag paper, highlighting a significant knowledge gap in the area.

The proposed skill enhancement areas - producing viable rag pulp and producing sheets of paper to be turned into consumer products - would enable a more sustainable approach to the design and production of paper-based products, while also reducing the amount of clothing waste that ends up in landfill every year. Paper is a uniquely circular material as it can be recycled many times. The application of such skills is crucial to addressing the problem of overconsumption of fashion and reducing the massive amount of textile waste generated annually.

In addition, the historical significance of rags as the primary source of papermaking in Western Europe underscores the importance of investigating the development of these skills further. Ultimately, this applied research could lead to radical innovation, transforming discarded clothing into valuable resources and reducing the environmental impact of the fashion and textiles industry.

3 https://www.smh.com.au/lifestyle/fashion/you-re-not-imagining-it-fast-fashion-is-ruining-op-shops-20240213-p5f4hr.html

4 Manteco, in Prato, Italy, is well-known for recyling woolen fabrics into new yarn and cloth.

5 Late Japanese fashion designer Issey Miyake is known for producing his fashion items from recycled polyester.

Methodology

Extensive background research was done before embarking on fieldwork. This background research involved primary research in papermaking, secondary research using books and web resources, and preliminary online interviews with project participants. Fieldwork for this project was done via interview, participant observation, practice-based research, and historical research. During the fieldwork phase, the Fellow visited 6 sites of relevance, including two London-based community-scale textile recyclers (FibreLab and Yodomo), two UK-based hand papermaking mills that recycle rag into paper (Two Rivers Paper in Somerset, and The Paper Foundation, Kendal), and two archives of historical paper objects and resources (ATOPOS paper clothing archive in Athens and the Schmoller Collection Collection of Decorated Papers at Manchester Metropolitan University). This fieldwork was undertaken over June and July 2024.

Abbreviations / Acronyms / Definitions

Circular Design

Circular design is an approach to product and system development that focuses on minimizing waste and making the most of resources. It involves designing products with their entire life cycle in mind, ensuring that materials can be reused, repaired, remanufactured, or recycled rather than discarded. The goal is to create a closed-loop system where materials continuously flow through cycles of use and regeneration, reducing the need for new resources and minimizing environmental impact. Circular design principles often emphasize durability, recyclability, modularity, and sustainability.

Paper

Paper is a nonwoven material produced by pressing together moist fibres, typically cellulose pulp derived from wood, rags, or grasses, and drying them into flexible sheets. It is primarily used for writing, printing, packaging, and a variety of industrial and artistic/ design applications. Paper can vary widely in terms of texture, weight, colour, and finish, depending on the type of fibres used and the manufacturing process. The invention of paper is attributed to ancient China around 105 AD.

Figure 1. Sheets of handmade paper drying at Two River Paper Mill

Pulp

Pulp refers to a slurry of fibres derived from wood, recycled paper, or other fibrous materials. This pulp serves as the raw material from which paper is manufactured. The process typically involves breaking down the raw fibres mechanically or chemically into a watery suspension, where they can be manipulated into thin sheets and dried to form paper. Pulp quality, derived from the type of fibres used and the manufacturing process, greatly influences the final characteristics of the paper produced, such as its strength, texture, and absorbency.

Figure 2. The Fellow removes some semi-beaten pulp from the beater as it is being beaten at Two Rivers Paper Mill

Rag

Rag is a term used to denote discarded fabrics. In the historical context of papermaking, these have been bedlinens, clothing, rope, mail sacks, and other household textiles made of natural fibres. The term “rag paper” is a trade term often used for artists paper currently on the market, but they are likely not made of discarded fabrics that have been recycled. Instead, they are likely made of pure cotton fibre sold to papermakers in sheet form. The cotton for these sheets comes in the form of cotton linters[6]. Though it is difficult to be absolutely accurate, it is widely agreed that the earliest forms of paper in China (around 105 AD) were made with hemp rags. This practice was continued in Europe as the other materials used to produce paper were not available in Western Europe, but cloth rags made from natural materials could be found in abundance.

Up to even the mid-20th century, used rags were marketed in a number of grades according to cleanliness, quality of fibre and colour. The highest grade ended to be offcuts from manufacturing using textiles (clothing, tablecloths, furniture, etc.), whereas the lowest grade were rags that likely needed to be chemically degraded. For the papermaker, the decision on what kind of rags to purchase was economic and based on a variety of factors including the difficulty of cleaning, sorting, removing any buttons, hooks, zips, and removing dye from rags (keep in mind the ideal sheet of paper was perfectly white and even with no inclusions). Ragpicking became increasingly difficult for the papermaker by the mid 20th century as manmade synthetic fibres such as nylon and rayon became ubiquitous. Blended yarns were especially difficult to identify and manage as the fibres cannot be separated, and the synthetic fibres do not break down when beaten. The work of preparing this raw material is, like most tasks performed by the papermaker, labour intensive but determines the quality of the final sheet of paper.

6 A cotton linter is a short fibre that remains on the cottonseed after the longer cotton fibers (lint) have been removed during the ginning process. Linters are typically too short to be spun into yarn, but they are valuable for other purposes, such as producing lhigh-quality paper, cellulose products, and medical supplies. They are a key raw material in the manufacturing of items like banknotes, fine writing paper, and even certain types of chemical products like cellulose acetate.

Papermakers who participated in this project identified the difficulty in procuring high quality rag with no additives or synthetic fibres. Both Two Rivers Paper Mill and The Paper Foundation are working directly with linen producers and textile recyclers such as FibreLab to assure the quality and content of their rag.

Cotton Linters

Cotton linters are thick sheets of short cotton fibres that have been collected after the cotton is ginned. They are used in papermaking and have also been used to create disposable face masks.

Figure 3. Linen rag scraps cut up and ready to be added to the beater at Two Rivers Paper Mill

Figure 4. A sheet of cotton linter being torn in two for demonstration purposes at Two River Paper Mill

Mould and deckle

A mould and deckle are tools used in traditional papermaking. The mould is a flat frame with a fine mesh screen, while the deckle is a removable frame that fits over the mould. The deckle defines the edges of the paper, which is why handmade sheets of paper have what is called a “deckle edge,” which is the uneven, uncut edge of the sheet. To make paper, a slurry of pulp is pulled through the mould, and the deckle helps shape the paper and keep the pulp in place. Excess water drains through the mesh, leaving behind a sheet of wet paper that is then pressed and dried.

Sizing

In papermaking, sizing is the process of treating paper or paper pulp to alter its absorbency and improve its surface qualities. This treatment makes the paper less porous and more resistant to ink or water penetration, which enhances its printability and durability. There are two main types of sizing: internal sizing, where agents like rosin or synthetic chemicals are added to the pulp before sheet formation, and surface sizing, where agents are applied to the surface of the finished paper. Sizing is essential for producing paper suitable for writing, printing, and various industrial applications.

Figure 5. Antique moulds and deckles from shuttered paper mills, stored in the archive of The Paper Foundation. The UK’s last mould and deckle maker was named Ron McDonald, who sadly passed away in 2016

Figure 6. Internal sizing used at Two Rivers Paper Mill to achieve their signature watercolour paper strength. This is added to the pulp

Fellowship context

Rags make paper,
paper makes money,
money makes banks,
banks make loans,
loans make beggars,
beggars make rags.

- An anonymous Scottish saying

The scope of this fellowship focuses on initiatives emerging in response to the problem of increasing textile waste, or those that can offer insights on heritage crafts that can be repositioned to respond to contemporary problems. By conducting fieldwork with textile recyclers and papermakers, and then supplementing the knowledge gained with archival research into paper-based design outcomes, this research aims to investigate how paper can be an impactful method of material usage and a step towards material circularity in the fashion and textiles supply chain. This fellowship was centred mainly in the UK, with one additional location in Athens, Greece.

Paper is an incredibly versatile material and has been used to design many things for everyday life. There are numerous examples that span architecture, fashion, furniture, and object design. But before describing the examples of how it can be used, first the simple question of “what is a sheet of rag paper and how is it made?” should be asked.

UK Papermaking, a brief history

The water turns my mill wheel round,
Where rags to paper pulp are ground:
Their snowy leaves on felt I lay,
And squeeze the water well away,
And then I hang my sheets to dry:
All white and shining like the sky.

- The Papermaker, by Hans Sacks, about 1550

Paper, a moulded and pressed mat of nonwoven fibres, is one of the most important materials in human history. Though some forms of “paper” for writing and communication existed previously (papyrus, vellum, parchment, wooden sheafs, leaves, etc), the paper that we are familiar with today has a much longer history that begins in the East. The inception of papermaking has been attributed to the efforts of a Chinese man named Tsai’Lun, who, around the year 105, collected vernacular information about the development of new paper technology, and the recycling of materials to make nonwoven fibrous sheets. He took these to the court and presented them to the emperor and eventually was supported to formalize and develop the methods for making paper. Much later, it is said that in in the year 751, Arabs captured some Chinese papermakers at the battle of Tallos, near Turkey, on the borders of the Chinese empire. The captives were forced then to share their knowledge of making paper from rags and other materials including the inner bark of the paper mulberry tree. The Moors, on their conquest of Spain, are thought to have brought papermaking knowledge to the West by setting up mills in Toledo and Valencia as early as 1086 and 1056. The first paper mills in France were opened in the 14th century, with the Troyes region being the most important. It is clear when reading this history that papermaking in the East pre-dated papermaking in the West by almost 1000 years, and that the materials for making paper were vastly different.

Paper was used mainly for writing, and in 1446 when Johann Gutenberg invented the world’s first press that expedited the creation of pages, the demand for paper increased. Before this time, basic printing had been carried out by carving a complete page out of a solid block of wood. In Gutenberg’s press, the letters and images could be re-used for other plates and pages. The development of this press allowed him to print an entire bible by 1456. It has been said that he needed the skins of 300 sheep to print this bible, per copy. He printed about 36 copies on parchment (about 10,800 sheep) and the remaining 180 copies on paper. As the skills and techniques for printing improved and spread in Western Europe, so did the demand. Paper was the logical choice to meet this increasing demand.

The first paper mill in England was opened around 1494 By John Tate the younger (son of John Tate the older, Lord Mayor of London). It was located at Sele, near Hertford on the River Lee. All paper was

handmade as individual sheets using wooden mould and deckle sets until the 1790s when a French man named Louis Robert devised a machine that could make continuous lengths of paper instead of sheets. This cemented paper as the replacement for parchment (much to the relief of many sheep).

Rag picking and sorting

While the skills to make handmade paper did originate in China, the raw materials to make the kind of paper made in the East were not able to be obtained in the West. Without access to the inner bark of the Paper Mulberry tree, Western European papermakers opted to use a readily available alternative source of natural cellulosic fibre for their paper: rags.

The quality of the pulp determines the quality of the sheet, and the quality of the rag determines the quality of the pulp. Therefore, rag collection and preparation was a very important part of the papermaking process. Rag preparation was a lengthy, dirty process that was done by hand in the early days, and later with some machine and mechanistic intervention. The labour involved in procuring and preparing rags was immense. Before the work in the factory related to sorting the material for papermaking, items needed to be physically collected from the township. This often-dirty job was taken up by the rag picker, or 'rag and bone man,' as they were known in the UK. They were important figures in the urban economy and society, particularly during the 19th and early 20th centuries and played a crucial role in waste collection and recycling before modern sanitation systems were established.

The practice of rag-picking can be traced back to medieval times, but it became more structured and recognized as a profession in the 19th century, coinciding with the rapid urbanization and industrialization of Western European cities.

Thus, the origins of 'rag and bone men' as we know them can be traced back to this early industrial period. During the Victorian era, the profession became more organized. Rag and bone men typically used a cart or a handcart, and some even employed horses to help carry their collected goods. The growth of urban areas and the increase in consumer goods resulted in more waste, making the role of rag and bone men even more critical. Rag and bone men collected a variety of discarded items, including rags, bones, metal, glass, and other reusable materials. These items were then sold to merchants or directly to manufacturers. Collected rags were particularly valuable as they were processed into pulp for paper manufacturing, an essential resource in an era before widespread use of wood pulp. Bones were sold for use in making glue and fertilizer, while metals and glass were melted down and reused in various industries. Their activities contributed significantly to resource recovery and waste management during a time when formal systems were lacking.

Rag and bone men generally came from lower socioeconomic backgrounds and were often seen as part of the urban poor. Despite their important role, they were frequently marginalized and faced social stigma. The work was laborious and not well-paying, but it provided a vital means of income for many impoverished families.

The rag and bone man became a familiar figure in British culture as literature, television, and film often depicted them as colourful and sometimes romanticized characters. For example, the TV series "Steptoe and Son," which aired in the 1960s and 70s, humorously portrayed the lives of a father-and-son team of rag and bone men. Writers like Charles Dickens[7] and George Orwell[8] also referenced the lives of rag and bone men, highlighting the socio-economic conditions of the time.

The occupation began to decline in the mid-20th century with the advent of organized municipal waste collection and the development of modern recycling facilities. Increasing regulation and the rise of new technologies in waste management reduced the need for informal scavenging and resource recovery.

The rag-picker, despite being an often-overlooked figure, was a crucial part of the urban ecosystem in historical France and the UK, contributing to early recycling efforts and reflecting the social dynamics of the time. They played an essential role in early recycling and waste management and are remembered as part of the social fabric of urban life during a period of significant industrial and economic change.

Once at the mill, rags needed to be sorted for fibre (to remove any protein or synthetic fibres) and colour (to make removal of dye easier), have all contraries (buttons, hooks and eyes, and any other metal parts) removed9, then cut up into small pieces using stationary blades and then possibly damped and retted (rotted or fermented) to soften them before beating them into a pulp using a stamper or Hollander beater. The sorting and cutting were said to be dirty and dangerous work, as rags could carry plague and pestilence. Though the used clothing, bedding, rope, mail sacks, and other items that became rag would need to be cleaned, it was still advantageous to use textile waste, as the many impurities in the fibre have already been removed at the textile production stage and rags were readily accessible.

Rag is now only very rarely used in papermaking, as it has been replaced with the use of wood pulp and is made largely by machine, rather than by hand. In hand papermaking, rag is rarely used at scale as it is difficult to source, prepare, and pulp.

Designing with paper

One of the aims of this fellowship, in addition to knowledge gathering, is to consider the application of paper in a contemporary design context. From packaging to office supplies and household items, paper's applications are vast and varied. While the focus of this fellowship was the use of clothing to make paper and then the use of paper to make clothing, paper is an integral part of everyday life, and offers versatile medium for creativity and functionality in architectural, interior, furniture, lighting, and fashion design. This section introduces a small number of the many diverse examples of how paper is utilized in design10, highlighting its importance in artistic expression, practical uses, and sustainable practices. By examining these examples, we can appreciate the enduring relevance and adaptability of paper in modern society.

7 Charles Dickens referenced the rag and bone man in his novel *Our Mutual Friend* (1865). In this work, the character of Mr. Venus is a taxidermist and articulator of bones, closely associated with the world of rag and bone men. Additionally, the character of Silas Wegg, a street vendor and one-legged ballad seller, also has connections to the trade of collecting and selling discarded items, reflecting the lives of those engaged in similar professions.

8 George Orwell referenced the rag and bone man in his book *Down and Out in Paris and London* (1933). This work is a memoir of Orwell's experiences with poverty and homelessness in the late 1920s, capturing his time spent living among the destitute in both cities. The book provides vivid descriptions of the lives of the poor, including the rag and bone men who eked out a living by scavenging and selling discarded items.

9 In Victoria, there is a spot called Button Hill, near the location of the former Barwon Paper Mill, where castoff buttons from the rag sorting process can still be found.

10 This fellowship and report focus on the use of paper as a medium for designing useful and functional objects for use in everyday life, rather than artworks which are created solely for the purpose of expressing an idea or concept, though sometimes the boundary between the two realms is difficult to ascertain.

In architectural design

Shigeru Ban, a renowned Japanese architect, is known for his innovative use of paper as a primary building material. Known for his humanitarian efforts, Ban's work often addresses the need for temporary and emergency shelters. He pioneered the use of paper tubes, demonstrating their structural strength and sustainability in numerous projects, including the Paper Church in Kobe[11] and the Cardboard Cathedral in Christchurch. Ban's paper structures are not only environmentally friendly but also cost-effective and quick to assemble, making them ideal for disaster relief. His approach blends practicality with an aesthetic sensibility, challenging conventional architectural norms and showcasing the potential of alternative materials.

In furniture design

In the East-Asian context, paper has been used for centuries for lights and lanterns, but it may not seem the obvious choice for other forms of furniture that require strength for structural integrity, such as chairs and tables.

The most familiar piece of furniture made from paper may be the modernist and sculptural lamps created by Isamu Noguchi in the mid 20th century. Though originating in Japan, these lamps are now much-loved worldwide. These paper lanterns, created in 1951 and known as Akari Light Sculptures, ingeniously utilize traditional washi paper to create soft, diffused lighting. Made from washi paper and bamboo ribbing, these lanterns were handcrafted by artisans in Gifu, Japan, inspired by traditional Japanese Gifu lanterns and shoji lamps. The series has become a significant representation of Noguchi's work, bridging Eastern and Western mid-century design aesthetics.

While paper is a natural choice for lighting designs due to its warm, soft glow, it has also been used in furniture design to create lightweight, durable, and sustainable pieces. Frank Gehry, for example, created the "Easy Edges" series in the early 1970s, which featured furniture made from layers of corrugated cardboard. The tactile quality of paper adds a unique aesthetic to furniture, something unexpected, surprising, unusual, and sometimes even logic-defying. Paper's adaptability in design underscores its potential for innovation in creating sustainable furniture.

Japanese design firm Nendo was commissioned by fashion designer Issey Miyake to use waste paper produced through the fabric pleating process to create sophisticated and playful chairs called "cabbage chairs" (2008). The chairs were made from the paper used in the pleating process of the fabric he uses ubiquitously in his designs. Typically, this paper would be discarded, as it is a by-product of the pleating process. Nendo envisioned a way of peeling back layers of rolled paper and creating a seat.

In Clothing Design

Paper has been used for clothing design across many generations and cultures. The use of paper for clothing was, historically, one determined by necessity. For many generations and perhaps even since its earliest uses, paper has been used for clothing in Japan, China, and Korea. In resource-strapped inter- and post-war Germany, between 1930 to 1965, handbags and

11 Built on the former site of Takatori Church, which was destroyed in the fire following the 1995 Kobe Earthquake, this church community center and house of worship was constructed in just five weeks. A group of 160 volunteers used donated materials to complete the project. Designed with the potential for reuse, the structure was eventually moved to a disaster-stricken area in Taiwan ten years after its original construction in Kobe. (https://shigerubanarchitects.com/works/cultural/paper-church-kobe/).

clothing were made from forms of paper. The same follows for Finland, where paper textiles were used to produce furniture and even baby strollers.

Beyond pure necessity, contemporary fashion designers have used paper to connect with heritage, explore material limits, or even critique the disposable nature of clothing. Japanese fashion designer and textile innovator Issey Miyake has used paper in his work on multiple occasions, blending traditional craft with modern design aesthetics. His use of paper exemplifies his commitment to innovation and sustainability, pushing the boundaries of textile design. Miyake's fascination with paper stems from its versatility and cultural significance, especially in Japanese art and craft traditions and his use of paper aligns with his sustainable design philosophy. Paper is a renewable resource, and its incorporation into fashion reflects a commitment to eco-friendly practices. This approach highlights the potential of unconventional textiles in high fashion. He often used washi, a handmade paper from Japan known for its strength, durability, and unique surface texture. Washi's inherent qualities allow Miyake to experiment with form and structure, creating garments that are delicate, resilient, and provide an embodied critique of contemporary ways of making, wearing and using clothing.

Paper is a remarkably versatile material used across various fields of design, demonstrating its adaptability, wide-ranging applications, and potential for recycling (and being made of recycled materials). In fashion design, it is employed for highlighting issues around lifespan and use of garments, as well as creating intricate pleats, folds, and textural contrasts, as exemplified by Issey Miyake's innovative garments.

In architecture and interior design, paper can be used for lightweight, sustainable structures and furnishings, offering both aesthetic appeal and environmental benefits. Additionally, in product design, paper's recyclability and cost-effectiveness make it an ideal choice for packaging and disposable items, ensuring practicality and recyclability. Paper's unique properties allow designers to explore new creative possibilities while addressing ecological concerns, making paper an essential and dynamic material suitable for modern design practices. It's imperative now, in 2024, to look back at heritage methods for making rag paper and connect them with contemporary issues in order to design new systems that can support our society and the planet.

04
Fellowship Learnings

The fellowship learnings section has been divided into three thematic categories: Rag, Paper, and Archive. Each category is considered using different thematic frameworks, which will be introduced individually.

Rag

This section describes the fieldwork undertaken with two textile recyclers in the UK. Key themes identified to frame the fieldwork in these locations are as follows: community, recycling, and luxury. The findings in this section are vital as they relate to the key problem of waste addressed in this fellowship. Some guiding questions for reflection in this section are: **what small-scale initiatives are being developed that respond to fashion and textile overproduction? What challenges face these initiatives?**

FibreLab

London, UK

Figure 7. A textile waste collection from a luxury hotel being delivered to FibreLab's office and workspace in Fish Island, London, UK

FibreLab is a London-based business focused on textile recycling and designing circular solutions to post-consumer waste, headquartered in the neighbourhood of Fish Island in east London. FibreLab collects, processes, recycles, and aims to design systems to remanufacture textile waste into new materials and products.

With 80% of their supply chain in London and the remaining 20% in England more broadly, they avoid exporting materials where they may end up causing unintended problems. The company aims to eventually be able to create community hubs that offer FibreLab's services in different parts of the country outside of London. Their "hyper-local" approach reduces carbon emissions and supports the local economy.

FibreLab offers customizable services to businesses, including regular waste collection and impact reports. Their textile recycling service is the only one in London that does this. Much like the rag pickers and sorters of the old days, they accept natural, synthetic, and blended textiles from businesses, sorting them by fibre content and colour, removing contaminants, and processing them with a custom-built mechanical shredding machine to create raw, recycled fibre, and rag. These fibres and rag are then turned into innovative new materials and products usable across various industries. The process of sorting can be challenging, as some synthetic fibres are sometimes hidden in so-called natural fabrics—this can be in the form of a small percentage of elastane, or even a polyester thread wrapped in cotton, used to sew the piece together. These hidden synthetic materials can disrupt the recyclability of the waste textiles.

Figure 8. FibreLab's Claudia Ghandi shredding a fresh batch of textiles in their custom-built shredding machine

Though they do produce products as proof-of-concept and research development, their main focus is as a service business, rather than a product-based business; FibreLab is focused on finding creative pathways and solutions to the enormous amount of waste produced by the fashion and textiles industry. Work is being done in their studio on an ongoing basis to develop new uses for the downcycled fibre and rag they produce, as well as the more difficult-to-repurpose materials such as leather, zippers, buttons, and synthetic textiles. They work to find a use for all the waste materials coming into the business. FibreLab encourages businesses to recycle their textile waste and reintegrate the resulting materials into their supply chains, promoting a fully circular system.

Figure 9. Shredded bedsheets from a luxury hotel chain

Fibrelab's founder Kae Katz is a value-driven entrepreneur and planted the seeds for this business during her Masters study at Central Saint Martins' MA of Material Futures. It was during this time that she developed her ideas around circularity and recycling. These early ideas would later lead her to customize a shredding machine to be used for textile waste. Since graduating, she has won several awards for her work, including the 'Mayor's Entrepreneur Award for the Creative Industries' from the Mayor of London, the 'Better Lives Award' from Proctor & Gamble and an Innovate UK Fast Start Grant to fund FibreLab's future innovations.

PAPERTEX

What drew the Fellow to want to investigate FibreLab is PAPERTEX, a circular paper material made from textile waste recycled by FibreLab and manufactured entirely in the UK by hand papermakers Two Rivers Mill and the Paper Foundation. Currently their highest-selling product, FibreLab proposes that PAPERTEX can be used for swing tags, business cards, menus, marketing materials, notebooks, sketchbooks, and other applications they are still developing.

Figure 10. Sheets of PAPERTEX rag paper made from textile waste

Figure 11. Sheets of blue PAPERTEX paper made entirely of denim by Two Rivers Paper Mill

Figure 12. Printed business cards, letter sets, and swing tag samples made from PAPERTEX rag paper

Startup and small-scale independent businesses of this nature need to balance their values with financial returns in order to be sustainable; FibreLab achieves this balance by producing products for sale and offering services such as consultation and shredding. Due to the amount of labour involved in their work, their services and products are firmly situated in the luxury category – their clientele as well as their product pricing evidences this. They aim to produce luxury products that aren't able to be immediately visibly identified as having been recycled. In order to avoid an undesirable amalgamated visual appearance, they sort textile waste in order to control the visual quality and aesthetic of the final outcome, as can be seen in a sheet of Papertex that has a uniform colour. Papertex is an important material for supporting the circular use of resources as it is a material that can be recycled repeatedly.

Figure 13. A sheet of PAPERTEX rag paper produced for FibreLab by the Paper Foundation

Figure 14. FibreLab founder Kae Katz and project coordinator Claudia Ghandi inspecting a fresh batch of recently delivered rag paper made from luxury hotel bedsheets. The paper was made by the Paper Foundation

The Fellow spent a day at Fibrelab, during which time textile waste was delivered from a local luxury hotel, a local woman brought in her own waste to be shredded for a creative project involving a nearby school, and samples were being made for new product ideas. Ultimately, the success of this product and service depends on demand – the customer needs to be educated on the value of these types of recycled products and the value of paying to have their waste shredded. Yodomo, a textile recycler in the same neighbourhood as FibreLab, would later also speak to the Fellow about the importance of the wider community of people who are not already interested in recycling, and the need for larger behavioural shifts to encourage the uptake of these kinds of practices.

The notion of community is “everything,” says founder Kae Katz, who described the need for building a community not only of clients, but of like-minded businesses that complement FibreLab. For them, a community includes clients and visitors, but also other business which fill a gap and provide a service that FibreLab does not. For example, if they receive garments or textiles that still have potential value, they might give them to a maker or designer in their network who can upcycle or sell them. The filling they produce by shredding unusable textile waste is also in high demand from designers and students.

Yodomo, a textile recycler also located in the neighbourhood of Fish Island in east London, works differently to FibreLab, as they work mainly with pre-consumer waste (textiles that have never been used for anything). Because these two businesses work in a different niche in the market, they are able to support each other (they even share a storage space). Kae identified that it’s important to be responsive and be able to shape your business to fit into the gaps created by another. This is important in Victoria’s textile recycling landscape, as the only businesses currently active are large-scale and not community-based, and the council has yet to design systems that would facilitate the collection of textile waste. Ultimately, the scale and approach to this business makes it a boutique or niche offering to a local community and specialized clients who understand the value and social return of paying to have their waste shredded and recycled rather than sending it to landfill. It may not be easily scalable as it is, but as a business model further hubs could be developed in the future.

Yodomo

London, UK

Figure 15. Yodomo's window front

Yodomo, based in the neighbourhood of Fish Island in London, is an organization dedicated to solving aspects of the textile waste problem. They are looking at the part of the waste hierarchy related to pre-consumer waste, and they work with brands and manufacturers across fashion and interiors who produce textile waste as part of their industrial processes. Yodomo started as an online platform for makers, and still fosters creativity and sustainability through workshops and courses focused on crafts and making, but with a focus on repair, mending, and knowledgeability of materials. The aim initially was to encourage people to become active in extending the lifecycle of their garments, rather than passive consumers. Now, Yodomo has become a hub for textile recycling, offering fabric sometimes for free and often for sale, and offers a variety of hands-on classes, both in-person and online, covering topics such as textile recycling, upcycling, and other traditional crafts. By partnering with skilled artisans and small-scale businesses, Yodomo provides a platform for learning and preserving valuable craft techniques within the context of reducing waste by empowering consumers. This "army" of makers, as Yodomo's founder Sophie Rochester calls them, can be mobilized to use the immense amount of waste available as she believes that it's vital that people have a use for it and know how to use it.

The importance of community in Yodomo's mission cannot be overstated. By bringing people together to share skills and knowledge, Yodomo helps to build strong, interconnected communities that value and support sustainable practices. Small-scale businesses benefit from this collaborative environment as it allows them to reach a wider audience, gain recognition, and contribute to a circular economy. They, like FibreLab, share in the importance of transparency, community, and sharing, and are also exploring ways of spreading their business model by teaching others how to operate a Yodomo hub. Yodomo's founder Sophie Rochester explained to the Fellow that after starting the online platform for learning, she soon realized that she needed a physical location, a space where people could come and buy the pre-consumer waste textiles as the volume and stock turnover was too high to list online. "The deeper we got into it, the more we realized that actually the solution needs to be quite localized, and that physical hub was going to be needed," she explained, as digitizing each of the pieces of cloth available for sale would be too laborious, and, according to Sophie, could have a higher carbon footprint than the benefit of reusing it.

Textile recycling is the key focus for Yodomo, highlighting the environmental benefits of repurposing fabric waste. Through workshops on upcycling and recycling textiles, Yodomo educates participants on the importance of reducing landfill waste and conserving resources. As Sophie said, they began with a simple aim: "Can we stop 10 tonnes of waste being diverted?" But through this process, she realized that another shift was happening that had both economic and social impacts on the community in that she was "actually shifting hearts and minds in a way," by supporting behavioural change and shifting the mindset of local residents in relation to textile waste. This approach not only promotes environmental sustainability but also encourages creativity and innovation in circular fashion practices more broadly.

Figure 16. Deadstock and pre-consumer threads/yarns and bolts of cloth available at Yodomo

Figure 17. Yodomo founder Sophie Rochester

Sophie advocates for small-scale hubs over large-scale production, emphasizing rapid startup and sustainable growth. Recognizing the shortcomings of the current model of exponential growth, she now focuses on the potential of creating multiple clusters, similar to the original model she has developed for the company. This approach requires a different kind of knowledge sharing and embraces an open-source methodology. Yodomo aims to establish a blueprint for setting up creative reuse hubs, encouraging others to create similar centres to expand the movement. Inspired by existing scrap stores and creative reuse centres, Yodomo's decentralized strategy seeks to increase material reuse through collaborative efforts and shared frameworks. To achieve this, Yodomo plans to run workshops to teach people how to start their own hubs and share their successful business model.

Small-scale and flexible social-enterprise businesses like FibreLab and Yodomo are vital in a community as they provide an important service and shift towards behavioural change. Currently there are few options for Victorian consumers to recycle clothing or textiles more broadly that may not be able to be donated to an Op Shop or be resold.

Paper

This section describes the fieldwork undertaken with two hand papermaking mills in the UK. The first, located in Watchet, UK, was Two Rivers Paper Mill. For almost 40 years Two Rivers has been thriving as one of the only hand papermaking mills remaining in England. The second mill the Fellow had the opportunity to visit was the Paper Foundation, located in Burneside, UK. This is a more recently developed institution dedicated to the preservation and propagation of hand papermaking skills and knowledge.

Key themes identified to frame the fieldwork in these locations are as follows: disappearing knowledge, recycling, luxury, reverse-engineering. Guiding questions for the Fellow in reflecting on her experiences include: How are heritage crafts and hand labour valued and positioned in the market? What are the systems of support and challenges of knowledge transfer? How can longstanding heritage skills and practices be applied to contemporary problems?

Two Rivers Paper Mill

Watchet, UK

Figure 18. The main papermaking vat (right) and the vacuum table (left) at Two Rivers Paper Mill.

Two Rivers Paper Mill, located in Watchet, UK, continues the traditional craft of handmade paper production. Papermaking has been a part of the social and industrial landscape in Watchet since 1652. Paper production peaked in the region in the 1960s, when it provided jobs for six hundred local people. The mill that employed these people and acted as a social hub for the town, Wansbrough Paper Mill, closed in December 2015.

Nestled in the countryside of Somerset, Two Rivers has been producing high-quality paper using longstanding hand-made methods for decades. The mill uses natural fibres such as cotton and hemp to create a range of fine art papers that are highly sought after by artists, printers, and bookbinders for their exceptional texture, strength, and durability. Though they have a loyal following, the mill is listed on the

UK Red List of Critically Endangered Crafts[12]. This designation highlights the mill's precarious position and the risk of losing traditional papermaking skills. The mill's inclusion on the Red List underscores the urgent need for preservation efforts to safeguard this unique craft, which represents a vital part of the UK's cultural heritage and artisanal history, but also key knowledge that could be reframed and applied to contemporary issues around textile waste and overproduction.

Rags have always been vital in European paper production. At different points in history, the UK exported rags to France and the Netherlands, which made it difficult and expensive to produce paper in the UK. There is a similar issue happening now, which defies logic as there is such high amount of textile overproduction and excess. The issue is that the best fibres to use to produce paper are untreated cellulosic fibres, but much of the garments and textiles we use now are synthetic, printed, dyed, or include buttons and zippers. Jim Patterson, founder of Two Rivers Paper Mill, mentioned to the Fellow that it is becoming increasingly difficult to find rag of adequate quality to produce paper. The mill currently uses a mix of fibres, but mainly linen and cotton, and even buys linen on the roll.

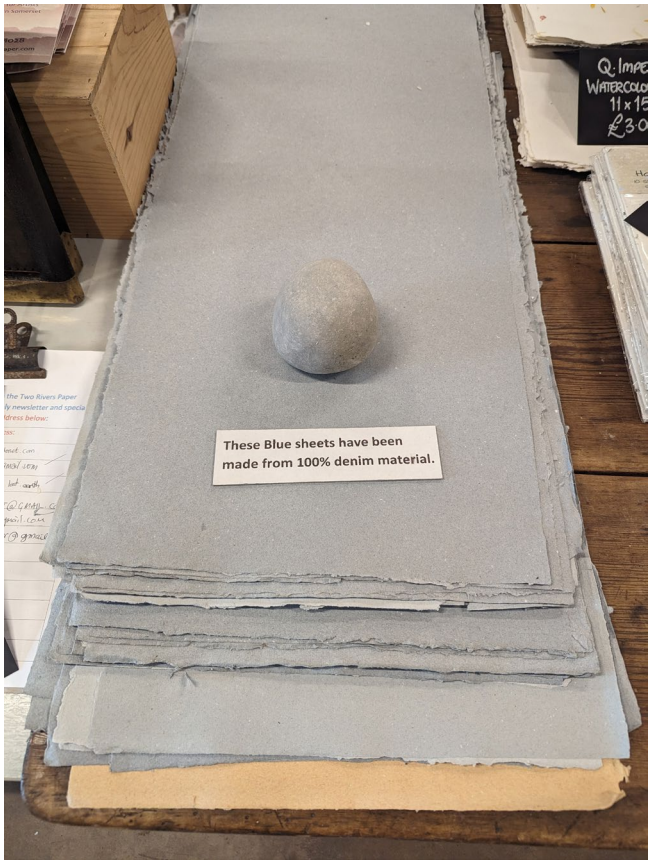


Figure 19. Paper made in collaboration with FibreLab, made entirely from denim.

12 Notably, mould and deckle making is already listed as "extinct" in the UK by the Heritage Crafts Association, who manage the Red List. The last mould and deckle maker in the UK was named Ron McDonald. He passed away in 2016, and both Two Rivers and the Paper Foundation have some mould and deckles made by him.

Jim, born in 1947, left school at the age of 16. His father was the managing director of a small paper mill in the north of England, continuing a family tradition or working in the paper business that dates back to the Victorian era. Jim also followed this tradition and worked in various mills in the UK, learning both hand and machine skills. In 1986, he bought the Pitt River mill, which at the time was missing its overshot (water) wheel. He managed to acquire a replacement from an old farm in Wales, which then powered the Hollander beater, a crucial component in the papermaking process.

Figure 20. (top) Jim's home at Pitt River mill, visible on the lefthand side of the cottage, in the background. (bottom the entrance to the mill

Figure 21. (top) The water-powered paper Hollander Rag-Beater, made in 1841. This was what the pulp used to be made on before the mill moved to the East Quay Art Centre in 2021. (bottom) The mechanism that ran the beater, run by a water wheel outside the window.

The mill has since moved from the 15th-century Pitt River mill[13] to the East Quay Art Centre in Watchet. Visitors to the mill at East Quay can observe the intricate process of handmade paper production, from the preparation of raw materials to the formation and drying of the paper sheets.

Figure 22. East Quay Art Centre, in the town of Watchet

Two River's paper is hard-sized, using internal sizing, with a tough surface ideal for watercolour, allowing artists to work on it much longer than with more absorbent papers. Since the paint doesn't penetrate the paper, the pigment dries to a sharp and brilliant finish (water beads off the surface of the paper, as was demonstrated to the Fellow). The inclusion of linen in its composition creates an exceptionally durable surface, resistant to lifting out, scrubbing, and reworking. Two Rivers produces handmade art paper with a unique, random surface texture, unlike the uniform weave of machine-made papers, making both sides identical and usable.

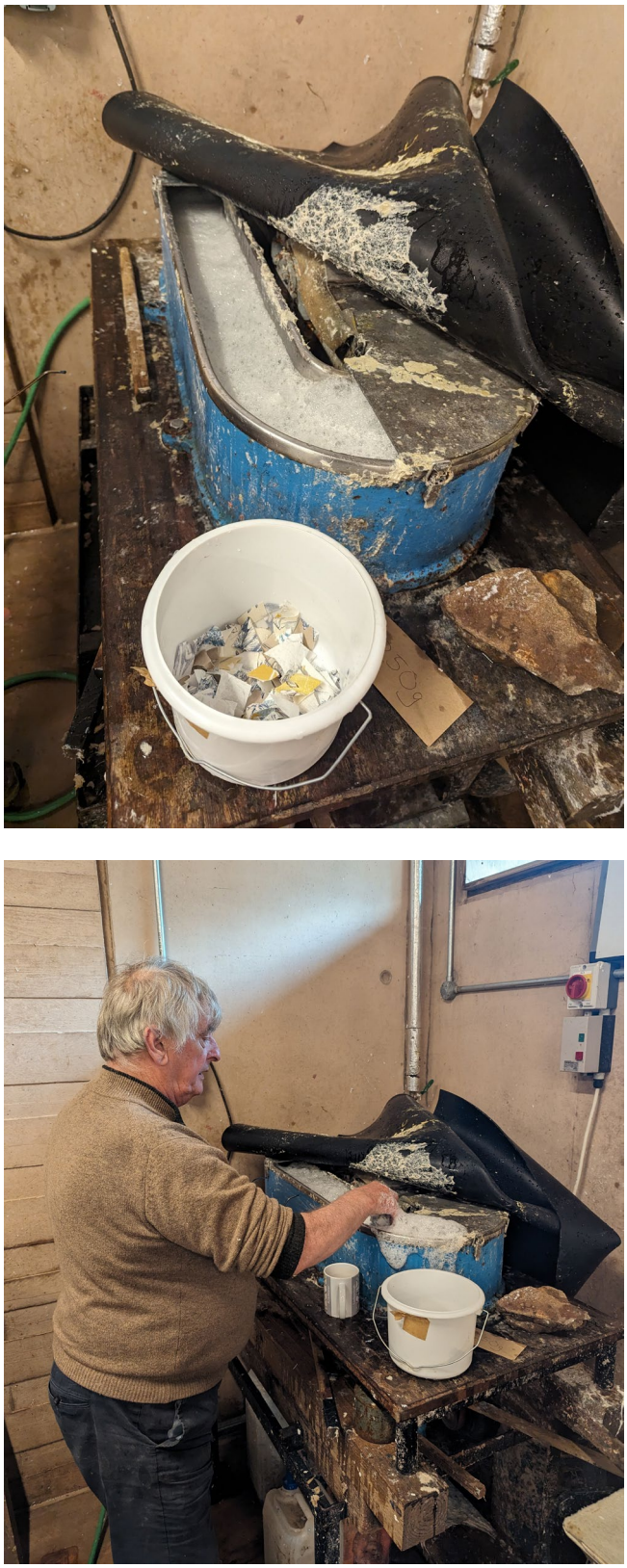


Figure 23. (top) Cut up rag ready to go into the beater. (bottom) Jim adding the rag to the beater

13 Over the course of its history, the mill was used for other occupations than paper, including grinding flour, as the family who owned it ran a bakery. Jim still has the original mill wheel from the bakery.

Figure 24. (top) Jim demonstrating how the rag starts to come apart after 10 minutes in the beater. (bottom Zoe demonstrating how she adds some red pigment to offset the blueish hues from mixed-colour rag

Their paper is versatile, suitable for watercolour, pastels, oils, printmaking, photographic processes, and mixed media. As one of the last handmade art paper makers in the UK, embrace the beauty of "selling imperfection."

During her visit, the Fellow had the opportunity to participate in the papermaking process, noting that pulling a sheet out of the vat, then producing an evenly distributed mat of fibres of the desired thickness is difficult and would take years of practise and muscle memory. "You have to be fluent in the movements," remarked Zoe Collis, the master papermaker working the vats at Two Rivers.

Figure 25. Zoe making a sheet of paper. Tilting the mould and deckle back and forth and from left to right is called the 'papermaker's shake' and evenly distributes the fibres across the sheet while removing some of the water, thus avoiding holes and making an even sheet

Figure 26. (top) After a sheet has been formed, it is placed on a vacuum table to bring together the fibres and remove some excess water. (bottom The felt mats used for couching are dampened before couching a sheet

Figure 27. The Fellow couching a sheet of paper onto a wool felt

Figure 28. The stuff chest, filled with pulp ready for when the vat needs to be "bailed over," meaning more pulp needs to be added to maintain the desired thickness of the sheets. The papermaker has a measuring tool and keen awareness of how often they need to do this

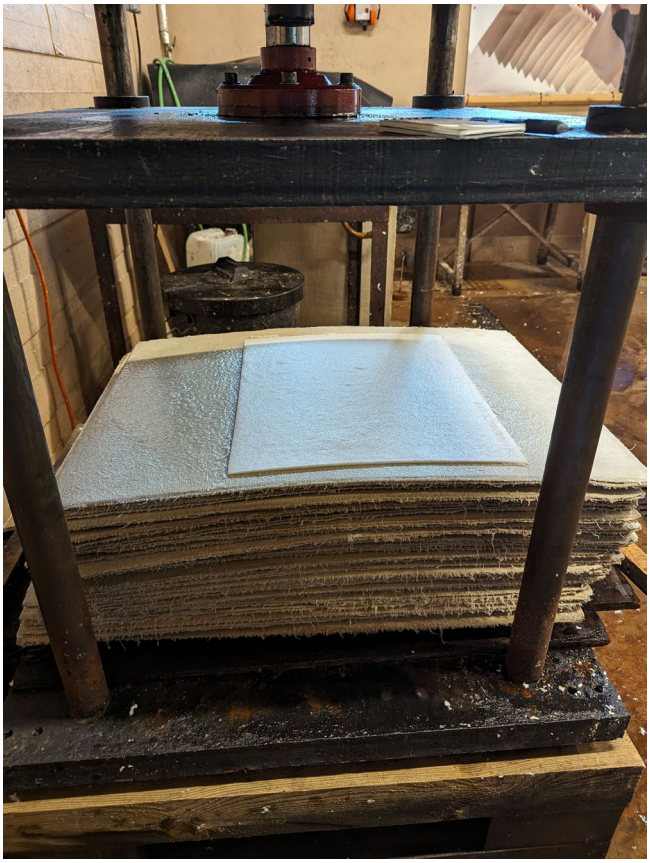


Figure 29. The press. Freshly made sheets are stacked here and the water is pressed out before drying

The Paper Foundation

Kendal, UK

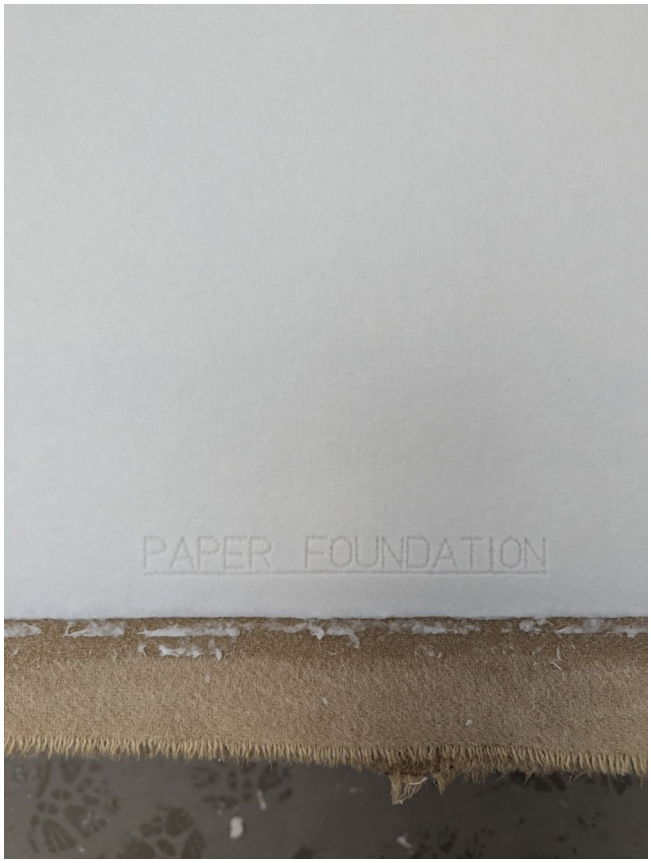


Figure 30. A watermark at the Paper Foundation

The second hand papermaking mill the Fellow visited was the Paper Foundation, located in Kendal, England. Situated in the picturesque town of Burneside, near Kendal in the heart of the Lake District, The Paper Foundation serves as a hub for artists, scholars, and enthusiasts interested in the historical and contemporary aspects of papermaking. Founded in 2016, it is an institution dedicated to the preservation, study, and promotion of papermaking and paper-related crafts. Clients who use its paper include the British Library, the Library of Congress, Disney, National Trust, Smythson, and the (former) Prince of Wales. It's founder Mark Cropper describes the aims of The Paper Foundation as follows:

- To preserve heritage, skills, and knowledge related to paper
- To promote paper related research and education

- To create a living institution, a real place where things are designed and made
- To celebrate paper via festivals and other events
- To ensure the continuation and evolution of various paper arts and crafts
- To enrich the ancient mill village and community of Burneside

Mark Cropper is the sixth-generation owner and operator of the James Cropper Paper Mill, which has been operated by the Cropper family for 178 years and continues to make high-quality machine-made paper[14]. The Paper Foundation, located in what was once the garden shed[15] at his home on the Ellergreen Estate, is separate (but still connected in terms of knowledge transfer) from the larger mill. While the larger James Cropper Paper Mill, a renowned papermaking facility with a rich history dating back to 1845, works at the cutting edge of machine-made paper innovation, producing paper from carbon and non-cellulosic fibres, contributing to the aerospace and renewable energy industries, the Paper Foundation endeavours to reclaim and innovate using hand and traditional techniques - longstanding but critically endangered. This relationship enriches the foundation's offerings, providing insights into both traditional and modern papermaking techniques.

Figure 31. The papermakers workshop at the Paper Foundation

Figure 32. The papermakers workshop at the Paper Foundation

14 More recent clients include high-fashion labels such as Burberry, who use James Cropper paper for their retail packaging, and champagne houses Ruinart and Perrier Jouet, who minimize plastic use by using 3D paper packing designed and produced at the mill.

15 The shed used to be a water-mill for grinding oats in the mid-19th century

On rare occasions when it is open to the public, visitors to the Paper Foundation can explore hands-on demonstrations, view collections of rare and historical papers, and participate in workshops that cover various papermaking methods. The foundation also collaborates with local and international artists to create unique paper artworks, fostering a creative community that celebrates the versatility and beauty of handmade paper as a medium.

In addition to its public programs, The Paper Foundation is involved in research and conservation efforts, working to preserve the knowledge and skills associated with papermaking. Its initiatives support sustainable practices and the use of eco-friendly materials, aligning with broader environmental goals.

Since 2016, the Foundation has prioritized two initiatives:

1. Establishing a specialist workshop and apprenticeship program to train dedicated craftspeople in the craft of hand papermaking[16].
2. Creating a library and archive of paper-related artefacts, tools, and resources.

The archive at the Paper Foundation contains objects from the James Cropper mill, and many other mills from around the UK that have, unfortunately, closed. This includes 36 moulds from Whatman, one of the UK's most significant papermaking mills and 375 moulds from Wookey Hole in Somerset, among others.

Figure 33. (left) a sheet of paper featuring a watermark of Queen Elizabeth. The archive also houses the original wax forms from which the watermark was created. (right) archival moulds and deckles featuring rare watermarks in the archive at the Paper Foundation

16 This hand papermaking workshop was developed though the collaborative endeavour of Chris and Mike Gibbs, who were the proprietors and papermakers at Griffen Mill in Ireland. When they decided to close their mill, their equipment, skills, and tools, were transferred to the Paper Foundation, making them the successor of Griffen Mill in 2021.

Mark Cropper, and by extension, the Paper Foundation and the James Cropper mills are both committed to circularity and material recycling. At James Cropper, the use of recycled fibres is driven by the need to mitigate pulp price volatility, reduce carbon footprint (as waste tends to be sourced locally from within the UK), and cater to a growing customer preference for waste-based paper. Being ahead of others on circularity also positions them well to have a leading position as more end-of-life legislation comes into play, and allows them to offer lower carbon products. The company's leadership in circularity is evident from its pioneering coffee cup recycling facility, developed between 2010 and 2012 with a £5 million investment, which now processes post-consumer waste. They have played a leading part with industry and UK government developing the infrastructure and protocols to make this happen.

Building on this success, James Cropper aims to expand its use of textile waste, overcoming challenges similar to those faced in coffee cup recycling, to meet the high standards of luxury brands and the art market, as their biggest customers are luxury brands and artists. The James Cropper mill has one product range already using textile waste at 20% but is keen to do a lot more. There is a similar opportunity to coffee cup recycling in that most textile waste is contaminated with artificial fibres which are extremely hard to remove (and a major reason textile waste goes to landfill). This is akin to coffee cups being coated in 2% plastic, which they developed a suite of processes to remove. They are now working on processes to remove artificial fibres from textile waste as they need clean cotton fibre as their clients (the world's leading luxury brands, artists, etc) don't tolerate visible contamination.

The Paper Foundation also focuses on recycling cotton and linen to produce stronger, longer-lasting paper. Linen, especially, has a long fibre meaning papers can be lighter with the same strength, which is much more resource efficient. According to Mark Cropper, "textile recycling is an amazing way to build customer and other partnerships with high end users in fashion; our Soho House [in collaboration with FibreLab] project is a good example of this. This also applies to James Cropper".

Figure 34. Rag paper samples and experiments

Archive

This section describes the fieldwork undertaken with two archives—one in the UK and one in Greece. Key themes identified to frame the fieldwork in these locations are as follows: Speculative use cases, reverse-engineering and critical design. This archival research is a key activity in developing an understanding and working practical theory of how rag paper could potentially be used in circular manner and applied in everyday life. Key questions guiding the reflection of this section are: if clothing is to be recycled into paper or paper-like materials, then how can we conceive it's aesthetic? Can the rag paper or pulp be recycled again into clothing or other objects for everyday use?

ATOPOS CVC

Athens, Greece

Figure 35. A table at ATOPOS CVC that holds archival boxes containing paper garments from Japanese history

The best description of this art organization comes directly from their website:

> ATOPOS cvc is a non-profit, cultural organisation interested in the expression and adornment of the human body. It researches and initiates innovative projects of contemporary visual culture in an 'atopic' manner. The word 'atopos', from the ancient Greek "άτοπος", refers to that which is the strange, the unwanted, the eccentric and the unclassifiable. It was founded in 2003 by Stamos Fafalios and Vassilis Zidianakis. With their varying backgrounds of art, architecture, fashion and anthropology, the two merged their interests to create an interdisciplinary platform for the arts.

ATOPOS cvc may be somewhat difficult to classify, but what is very clear is that they support the development of the arts in the broadest capacity, including research and practice related to “the expression and adornment of the human body.” More importantly to the Fellow, they have what may be the largest and most diverse private collection of paper clothing in the world. It is for this reason that the Fellow used the opportunity of the fellowship to travel to Athens, upon invitation from ATOPOS to complete a residency in the space.

The collection

The ATOPOS collection was developed to stimulate research into the culture of dress and the history of design, focusing on innovative and less familiar themes (Pichou 2020). ATOPOS has a library, a curatorial practice, and a residency program to achieve this aim—it also has an archive of design objects that were the focus of this fellowship and the reason the Fellow conducted a residency on site. At the core of the ATOPOS collection is a suite of roughly 400 1960s-era disposable paper dresses, produced during a ‘fad’ for disposability at the height of the optimism of the space age. In addition to these pieces, the collection houses paper clothing artifacts that stretch back into history, and some more recent from contemporary fashion designers and artists. The former includes paper kimono-style Japanese garments, and the latter includes experimental paper fashion designs from Martin Margiela, A.F. Vandevost, and others.

The residency

The Fellow conducted a 1.5-week residency on site in Athens, Greece at ATOPOS CVC. It was a collaborative residency, shared with members of d_archive (www.d_archive.io), an online platform for knowledge sharing related to rare and unusual fashion objects. Upon being invited to participate in the fellowship, the Fellow invited d_archive to join as collaborators as she felt that it would be enriched by their perspective and skills, and that they shared the same values and overall aims. The goal of this residency was to create and share new knowledge about paper clothing pieces in the collection of ATOPOS CVC.

Figure 36. Paper dresses, circa 1966-68

Figure 37. Maison Margiela paper-coated t-shirt S/S 2010. Designed to wear away and leave a paper footprint as you move through life

This was done via:

- Digitization of pieces in the collection, including making their digital rendering and patterns available to be viewed and experienced by the public;
- Bringing historical/material/contextual/technical knowledge to the pieces.

During the residency, the Fellow had access to the paper clothing collection and the library of historical and contemporary books on art and design which focus on the use of paper, both of which are unparalleled. The Fellow conducted primary object-based research, secondary literature, contextual and historical review and finally offered a public workshop to discuss some of the initial findings of the fellowship with a local community of artists and fashion and textile designers.

What worked very well was that the Fellow and d_archive had different aims for data collection and synthesis during the residency, and that both collaborators brought different knowledge and skills, and there was a strong area of overlap in which they could produce knowledge about the pieces in the collection. The next steps are to produce the outcomes of the residency, which are digitized versions of key pieces in the collection (d_archive will do this), which will be accompanied by descriptive text[17] (the Fellow will do this task).

The pieces that will be included in the digital repository are as follows: a set of tabi shoe patterns, a paper coat worn (possibly) by a delivery person, a sodenashi (vest), a kappa (cape), a woven kimono overcoat, a kimono made of recycled ledger paper, a Pilipino military cape, and a set of paper dressing objects that perhaps might have been worn by a horse. A sample of the item descriptions are included below.

Tabi shoe patterns

Figure 38. A tabi shoe pattern

This is a set of cutting patterns in many sizes for Japanese tabi. Tabi are traditional Japanese socks that have a split between the big toe and the other toes, designed to be worn with thonged footwear such as geta and zori. They are typically made of cotton and are often fastened with metal tabs or hooks at the back. Tabi socks are worn in various cultural settings, including with traditional clothing

17 Please note that some of these observations require further historical or chemical analysis to be conclusive.

like kimono, and for activities such as martial arts, tea ceremonies, and festivals. Modern variations exist that are worn with regular shoes and can also be cut in leather, soled with rubber or leather and worn for fashion purposes (such as the popular tabi boot made by fashion designer Martin Margiela).

The tabi patterns in this set include tabi with no overlap at the back of the ankle to accommodate hooks. This can be easily added, or they be stitched together at the back and left open on the front of the foot, as seen in a leather sample in the ATOPOS archive.

This set of tabi comes in many sizes from children to adults and are created on many different repurposed sheets of paper, including handmade paper, ledger paper, and wrapping paper. There are three pieces per pattern size (sole, inside, outside). Some of the pattern pieces, such as that pictured below, have been treated with a fermented persimmon tannin dye (kakishibu), which would make the paper stiffer and more durable. Some are also textured on both sides, which might be due to the application of a fusible interfacing glue applied on one side to prevent slipping when being used.

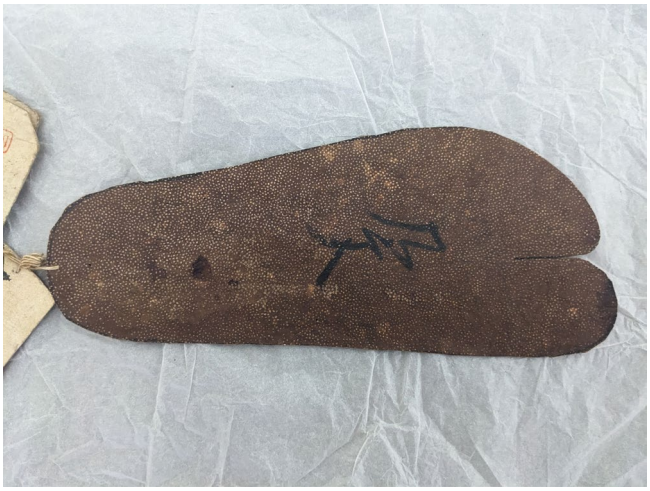


Figure 39. A tabi shoe pattern, what is possibly fusible interfacing is visible in this image, as is the brown colour of the fermented persimmon tannin dye

A paper coat worn (possibly) by a delivery person:

Figure 40. A jacket possibly for a delivery person

This overcoat, possibly designed to protect both the wearer and their cargo, features an oiled paper construction treated with persimmon tannin and blackened on the outside (potentially with ink). A distinctive circle motif adorns the front, which is unusual as this motif typically has a family crest inside it. The front is secured with two ties. These ties consist of eight strands of two twisted threads, further twisted together and indigo-dyed kumihimo, stitched to the garment using paper facings.

Figure 41. Visible mending

The jacket has visible repairs and is made from sheets of undyed handmade paper glued together to repair the original paper, with the repaired areas clearly visible. The paper used to produce this garment, known as momigami, is notably very stiff. Further chemical investigation is needed to determine why the jacket is black and how the motif was created. The small tab at the back of the neck is also unusual, and 3D modelling might help to determine possible uses as physical manipulation of the piece is not possible due to its fragility. The neck opening also seems particularly small, leading the Fellow to think that it may be possible that this is not a garment, but a protective housing for a specific object.

Figure 42. Back of the overcoat, featuring an oak leaf crest

The back of the overcoat features a large crest called a maruni makinokashiwa, a triple oak leaf crest enclosed with a circle. The oak leaf has been considered sacred since ancient times, when it was used as a vessel for serving offerings to the gods. It was also loved by court nobles and warriors as a symbol of unbroken generations and continuity of the family because the leaves did not fall off until the spring sprouts appeared and came to be used as a family crest because of its religious significance and the wish for prosperity of descendants. It was used in areas such as Akita, Osaka, Yamagata, Saitama, and Miyagi.

Woven kimono overcoat

Figure 43. The Fellow inspecting the garment

Figure 44. Collar area detail

Figure 45. Fraying detail, revealing evidence that it was dyed after being woven

This kimono overcoat features no lining and is dyed with indigo, likely undergoing 8-10 dips. The fabric was probably woven and then dyed as a length before being constructed into a garment (this is evidenced by white dots visible on frayed yarns). Paper is used in the facings and collar, made from stacks of thin sheets of recycled ledger paper of varying weights—four on the right side and seven on the left. The outside facings contain thicker card. The kimono includes cotton kumihimo ties and neck connectors, and it's fabric was woven with a cotton warp and paper weft. It can be opened at the front or closed for warmth, with a linen back neck facing and paper inside the frog clasps. The entire garment, including the handmade paper elements, is likely was woven and stitched by hand.

The workshop

The Fellow, along with Martina Ponzoni of d_ archive, was invited to conduct a public workshop to disseminate some of the findings of the fellowship and residency. This was done over the course of one day, and 15 participants were selected to participate. The workshop explored 2 of the paper garments we are digitizing during the residency, including one from the collection of the NGV in Melbourne, Australia. The other was one from the ATOPOS archive, which was a kimono underwear made entirely of recycled ledger paper. We invited participants to learn about the garment and the research process we are undertaking by trying to reverse-engineer it themselves using cheap paper. This process allowed participants to understand what a replica means (how accurate should it be), the material limitations and possibilities of paper (by examining the physical artifact and manipulating the digital object) and understand the research methods employed by the Fellow and d_archive. The participants were split into two groups, one working from the digital rendering of the NGV archival piece, and one observing the physical garment in the ATOPOS collection. The response was energetic and positive.

Figure 46. The Fellow describing a paper garment to the workshop participants

Figure 47. Workshop participants re-creating paper kimono

The Schmoller Collection Collection of Decorated Papers

Manchester, UK

Figure 48. The Fellow examining pieces in the archive

Hans Schmoller (1916-1985) was a distinguished typographer and book designer, born in Berlin, Germany. He emigrated to England in the late 1930s, where he initially worked for Penguin Books, eventually becoming the company's head of typography and design. Hans was renowned for his meticulous attention to detail and his commitment to high-quality book production. Throughout his career, he amassed a significant collection of decorated papers, recognizing their importance in the history of book design and craftsmanship. His wife Tanya Schmoller (1918–2016) was also a significant figure in the world of bibliographic scholarship and design history, particularly known for her work with fine printing and her research on paper and bookbinding. She was an expert in the history of paper and papermaking techniques, which contributed to her status as a leading figure in the study of book arts. Tanya also authored and edited several books and pamphlets on subjects like decorated papers, textile printing, and hand bookbinding. Her work is celebrated in the field of book design, particularly in the context of fine arts and handmade paper.

The Schmoller Collection, now housed at Manchester Metropolitan University, continues to inspire and educate, preserving the legacy of his dedication to the art of the book. The collection was a joint interest and venture between Hans and Tanya Schmoller, and Tanya continued to develop and write/research the subject and collection for over 20 years after Hans' death.

The Schmoller Collection Collection of Decorated Papers at Manchester Metropolitan University Special Collections Museum is a unique assemblage that highlights the rich history and artistry of paper decoration. This collection includes a variety of papers adorned with intricate patterns, marbling, and other decorative techniques, reflecting a diverse range of styles and cultural influences. The collection serves as a valuable resource for researchers, students, and enthusiasts of bookbinding, paper arts, and design history, offering insight into the craftsmanship and aesthetic trends of different periods and regions. Since its inception, the collection has grown to include paper for everyday use in other contexts as well.

The collection includes marbling, paste papers, airbrushed papers, and much more. The Fellow has included some examples of the more than 4,000 sheets of paper in the collection, separated by technique, in her report.

Marbling

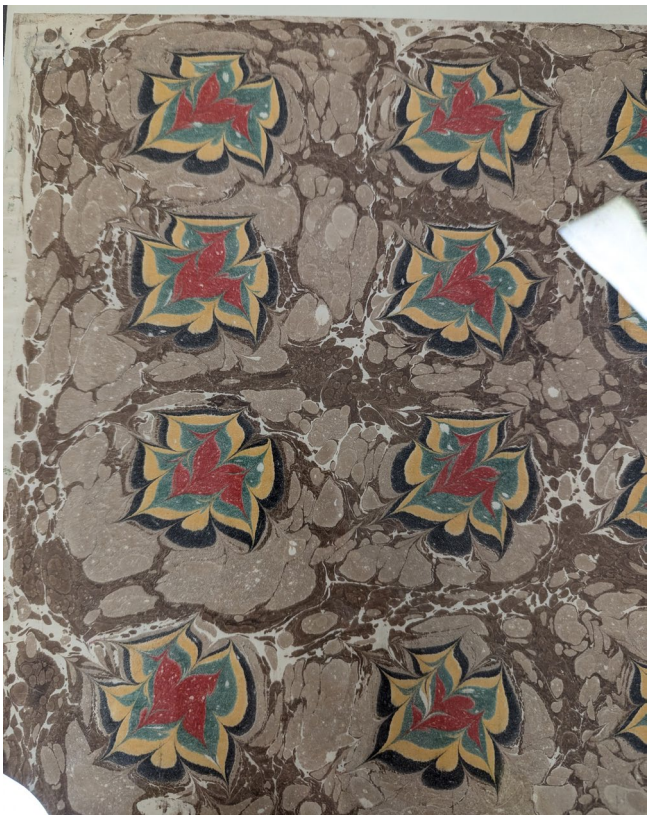


Figure 49. Marbled paper, Mustafa Duzgunman, Turkey, 1970s. Image courtesy of Manchester Metropolitan University Special Collections Museum

Marbling is a decorative technique used in the context of paper and endpapers, often found in books and stationery. This process involves creating intricate, swirling patterns on the surface of the paper, which mimic the look of natural marble. To achieve this effect, artists float colours on a liquid surface, typically water or a viscous substance like carrageenan, and then manipulate the colours with various tools to form unique designs. A sheet of paper is then carefully laid onto the liquid surface, transferring the pattern only once. The technique has historical significance and has been used for centuries in both Western and Eastern bookbinding traditions.

Paste paper

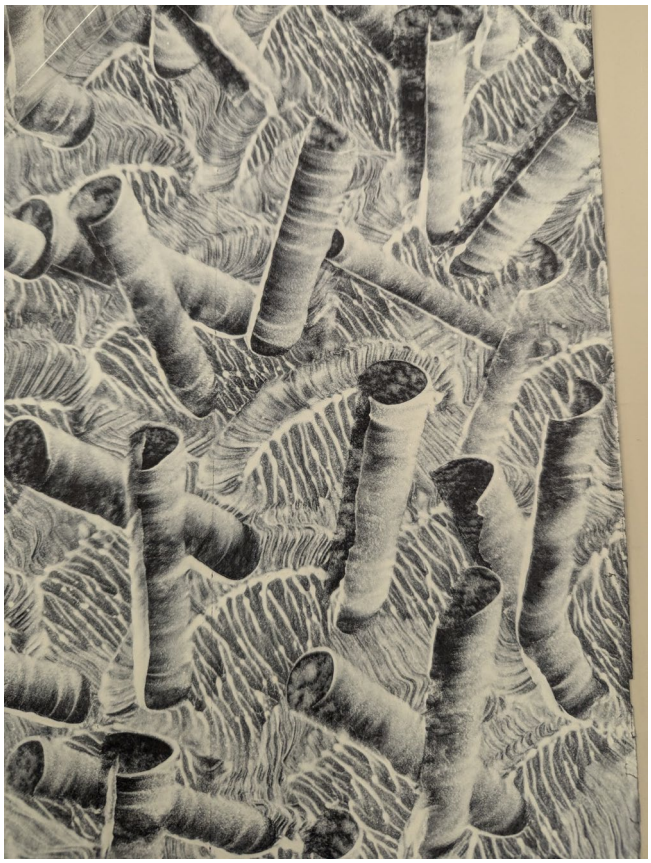


Figure 50. Paste paper, possibly Aschaffenburg, Germany, first half of twentieth century. Image courtesy of Manchester Metropolitan University Special Collections Museum

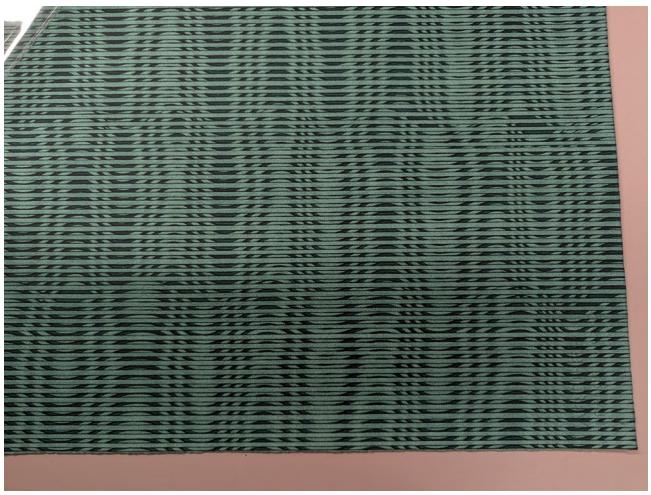


Figure 51. Paste paper in a moire pattern, Sage Reynolds, USA, 1987. Image courtesy of Manchester Metropolitan University Special Collections Museum

Paste papers are a traditional decorative technique used in bookmaking, particularly for creating endpapers. Historically, paste papers have been used in bookbinding since the 16th century, and they continue to be valued for their rich, handcrafted quality. This method involves applying a paste mixed with pigments onto paper and then manipulating the surface to create various patterns and textures. The paste is typically made from a mixture of starch or flour and water, which is then coloured with different pigments. These decorative endpapers serve both a functional and aesthetic purpose, providing added strength and durability to the book while also enhancing its visual appeal. The unique patterns and textures of paste papers can range from simple, elegant designs to intricate, detailed motifs, making each piece distinct.

The process of creating paste papers allows for a high degree of creativity and variation. Artists might use tools such as combs, brushes, stamps, or even their fingers to manipulate the paste and create patterns. Once the paste dries, the paper can be further embellished with additional layers of colour or design elements.

Airbrushed

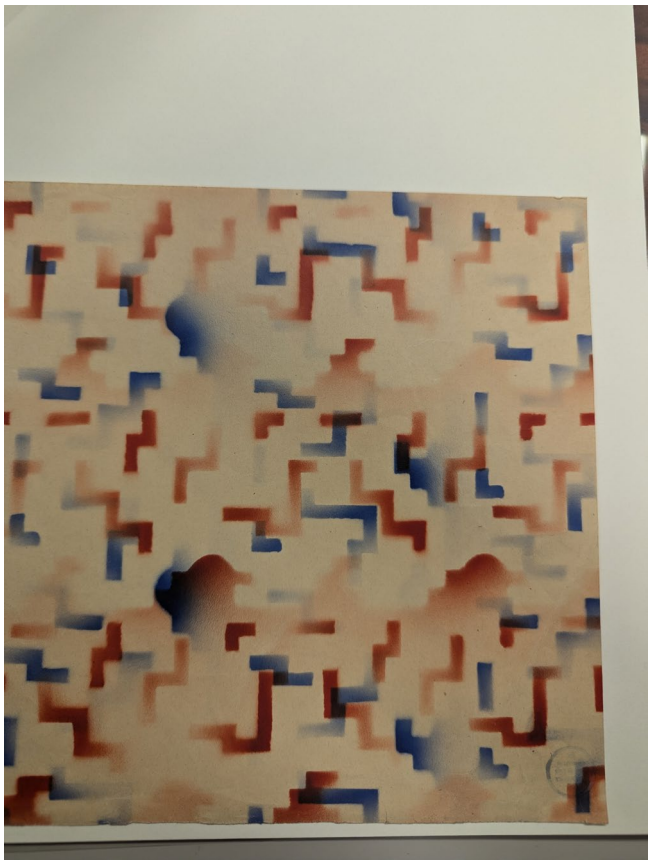


Figure 52. Airbrushed paper, probably German, mid twentieth century. Image courtesy of Manchester Metropolitan University Special Collections Museum

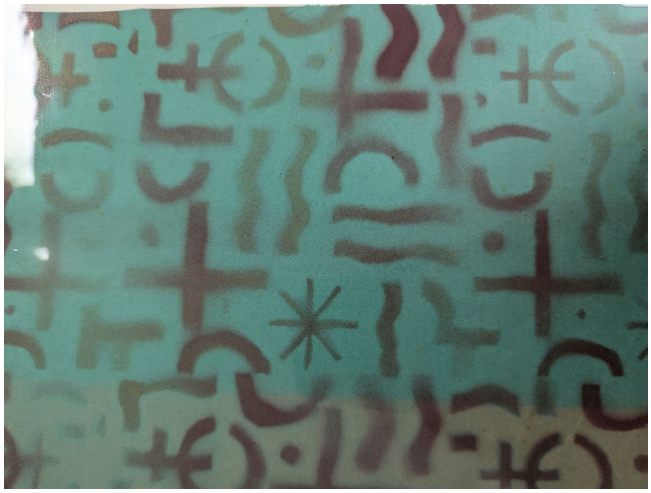


Figure 53. Airbrushed paper, probably German, mid twentieth century. Image courtesy of Manchester Metropolitan University Special Collections Museum

German airbrushed papers are a distinct and exquisite form of decorative paper traditionally used in bookbinding and fine crafts. This technique involves applying colour to the paper using an airbrush, which creates soft, smooth gradients and intricate patterns. The process allows for precise control over the distribution of pigment, resulting in beautifully subtle or boldly dynamic effects. Historically popular in Germany, these papers are often characterized by their vibrant hues and delicate transitions, making them ideal for endpapers, covers, and other decorative elements in books. The craftsmanship involved in creating German airbrushed papers showcases a high level of artistry and attention to detail, contributing to their continued appreciation and use in contemporary book arts and design.

Everyday life

Figure 54. Paper lace, early to mid twentieth century. Image courtesy of Manchester Metropolitan University Special Collections Museum.

Figure 55. Paper lace, early to mid twentieth century. Image courtesy of Manchester Metropolitan University Special Collections Museum.

In the early and mid-20th century, paper was frequently used as a substitute for traditional textiles during periods of economic hardship. This practice became particularly prevalent during and after the World Wars, when resources were scarce and the demand for affordable materials surged. Paper, being more readily available and less expensive to produce than fabric, was ingeniously adapted for various uses, including clothing, furnishings, and packaging. Paper garments, for instance, were fashioned from durable, treated paper that could withstand wear, offering a practical yet temporary solution for everyday needs. Similarly, paper was utilized for household items like curtains and tablecloths, reflecting the ingenuity and resourcefulness of the time. These adaptations highlight the versatility of paper and the resilience and adaptability of people in response to material shortages.

Figure 56. Paper lace, early to mid twentieth century. Image courtesy of Manchester Metropolitan University Special Collections Museum.

The works contained in both of these archives evidence that paper continues to be a versatile and adaptable medium for producing works of beauty and function suitable for everyday life.

05

Personal, professional, and sectoral Impact

Personally

The personal impact of this fellowship was immense. Firstly, the Fellow was able to learn and enhance specific skills in the papermaking mills that would be difficult, if not impossible, to learn outside of a mill. Second, she was able to physically interact with valuable and rare archival material that provided her with a depth of knowledge otherwise unattainable. And finally, this fellowship gave the Fellow the chance to see the bigger picture of textile recycling, and get a sense of the difficulties, hurdles, and challenges as well as the opportunities present in the field.

This fellowship experience offered the Fellow an invaluable opportunity to become a member of a global community that is working to promote and preserve the critically endangered craft of handmade rag papermaking. Simultaneously, it gave the Fellow the chance to make connections, network, learn, and gain perspective and unlearn some false things she had believed. This fellowship is, at its core, about hope, and sometimes that obscures an objective gaze. In truth, many of the aims of the fellowship initially — to learn how to produce strong paper – are indeed possible, but through analysis and reflection on the learnings of the fellowship, the Fellow has realized that there are many challenges and hurdles to achieving her aims. More work needs to be done, and this can be done via smaller projects with more specific scopes. For example: a smaller-scoped project focusing only on textile recycling, another on applications for textile waste using rag papermaking methods, and of course, a final project on how rag papermaking knowledge can be supported through public education and apprenticeship programs.

The personal growth and experience gained through the fellowship can be disseminated in several impactful ways. The Fellow organizes and is often invited to conduct workshops, demonstrations, and seminars to share the specialized skills learned in papermaking mills, textile recyclers and archives. These events can be open to students, professionals, and the general public to provide hands-on experience and knowledge sharing. It's important that these workshops and seminars are not only conducted in educational institutes so they can reach a broader audience. Places such as Mpavilion and Melbourne Design Week are good examples of platforms that reach a broader, general public, but still attract an audience interested in design. The Fellow can also use her social media platform (Instagram) to share personal reflections, detailed processes, and techniques learned during the fellowship. Regular updates and posts can reach a broad audience and inspire others interested in the field of textile recycling and papermaking.

Professionally

As a lecturer, the goal of the Fellow is to guide Fashion and Textile Design students in making well-informed choices and to look to history and traditions for guidance on future practices, emphasizing knowledge preservation. In 2024, the School of Fashion and Textiles at RMIT University acquired a fabric shredder, which will aid in the implementation of the skills and knowledges gained on this fellowship into the curriculum. Leveraging the fabric shredder to implement hands-on projects and experiments within the coursework will enable students to apply theoretical knowledge practically. The Fellow also organized special sessions with students in the Bachelor of Textile (Design) and the bachelor of Fashion and Textiles (Sustainable Innovation) to conduct an off-campus learning experience with Papermakers of Victoria (PoV). During this activity, students were invited to use the Hollander beater maintained by PoV and make pulp from their textile waste. The Fellow then led the students in a rag papermaking workshop. The success and interest generated in this activity exceeded expectations, and the Fellow will continue to find ways of incorporating this learning into key courses that relate to circular principles addressing the issue of waste in fashion and textiles design while applying knowledge related to rag papermaking. These practical experiences can significantly enhance students' understanding and engagement with the subject matter.

As Program Manager of the Bachelor of Textiles (Design) and Bachelor of Fashion and Textiles (Sustainable Innovation) at RMIT University, the Fellow is responsible for overseeing the program, ensuring the highest standards of quality in the curriculum and staff qualifications. In 2024 the Fellow is working with a team of academics to design a Textiles and Materials minor that can appeal to students in many different disciplines. This fellowship has provided the Fellow with valuable insights and networks to inform the development process in terms of values and design thinking. As part of the dissemination activities of the knowledge gained during the fellowship, the Fellow will incorporate the skills and knowledge gained into the curriculum for Fashion and Textile Design students. This can include creating new modules focused on sustainable practices, textile recycling, and papermaking techniques specifically as a method for enacting sustainable and circular principles in design.

As a designer, working with Jake Nakashima-Edwards collaboratively as DNJ Paper, the Fellow will implement the knowledge and skills she has gained into practice. This will take the form of continued research and development of propositions for the use of paper in everyday design contexts. This includes two upcoming exhibitions, one during Melbourne Design Week (focusing on the innovative use of materials) and one during Melbourne Fashion Festival (curated by the National Trust).

In her role as an academic, the Fellow will conduct dissemination activities such as writing articles, research papers, or even a book documenting the experiences, challenges, and insights gained during the fellowship. This can be shared through academic journals, industry magazines, and online platforms. She has also recently been invited to be interviewed on the ABC, and by d_archive, during which she will discuss the fellowship learning and granting body.

Broader Sector

The Fellow aims to raise awareness of the environmental impact of fashion overconsumption and promote sustainable practices by offering paper made using traditional methods as an eco-friendly and biodegradable alternative. Further impacts on the broader sector could be achieved by collaborating with local papermaking communities and organizations to share newly acquired skills and foster innovation. This can include joint workshops, community projects, and collaborative research initiatives.

Exploring partnerships with local companies like Upparel in Melbourne, which focus on innovative textile recycling methods could lead to the development of new products and sustainable business practices. Collaboration with international fellowship participants could also have a broad and

positive impact, especially if there were opportunities to connect them to people on the ground in Melbourne. Collaborations could include activities such as educational exchange, commission of new artistic work, and international research and artistic residencies.

This fellowship has opened up pathways for further study both in the field and in the studio. Future research can be undertaken specifically in France, where rag paper has been made for centuries at mills such as Moulin de Verger and Moulin du Rocher. There is also a fast-growing startup in Paris called FabBrick that presses textile waste into bricks. They are in the business of textile recycling, and because they use a resin binder and do not make paper or use papermaking techniques, they can use the entire garment, including any zippers, fasteners or buttons. They can also recycle clothing of any fibre content, from natural to synthetic materials.

Future avenues for impact here in Victoria could be at the municipal and council level. The Fellow could work with local councils to raise awareness about the environmental impact of fashion overconsumption and promoting sustainable practices through public speaking engagements, media interviews, and participation in industry conferences. The Fellow could also work with local councils and municipalities to implement sustainable practices at a community level. This can involve creating programs for textile recycling, organizing community events, and advocating for policies supporting sustainable fashion and textiles.

06

Recommendations and Considerations

To combat the negative impacts of fashion and textile waste, a massive system change is needed. Additionally, to promote the preservation and innovation of heritage skills and crafts, new uses and education are essential. The Fellow's recommendations include insights from interview participants and are divided into two categories: reducing fashion and textile waste and recycling the waste using papermaking skills.

Reducing Fashion and Textile Waste

To **reduce fashion and textile waste, the principle that the polluter (producer) should pay** is emphasized. This can be achieved through the implementation of a **fashion tax**, similar to the system in France[18], as a tax on garments that lack an end-of-life plan. According to Mark Cropper of the Paper Foundation, legislated recycling and end of use partnered with circularity mandates will compel industry to evolve the supply chains to recycle waste more. **Better labelling and government oversight on the types of fibres** used in garments are also crucial. **Care labels** should genuinely educate consumers on how to care for and repair garments. Proper labelling in tandem with a reduction in the use of synthetic fibres and an increase in the use of natural fibres will **enhance biodegradability** and allow for their use in papermaking and recycling. Recycling could also be much easier if designers opted to use one material in every piece.

The export of textile waste should be banned, with a focus on finding and **funding** local solutions within Australia. The waste cannot continue to be shipped offshore; instead, solutions need to be developed locally. Greater support for community op shops and recycling initiatives is necessary. **Council-run exchange and recycling centres** could alleviate the burden on oversaturated charity shops. **Government subsidies** could help reduce the rising prices at op shops. Currently, some second-hand pieces are more expensive than new garments, leading consumers to choose fast, cheap fashion over second-hand options.

Recycling Waste Using Papermaking Skills

To support the **recycling of waste using papermaking skills**, several key initiatives and investments are necessary. Firstly, federal investment is crucial to develop an Australian circular textiles industry. This would ensure that

18 The proposed French fast fashion tax aims to reduce the environmental impact of the fast fashion industry by holding clothing manufacturers and brands accountable for the entire lifecycle of their products. This tax targets companies that produce large volumes of inexpensive, short-lived garments, which contribute significantly to textile waste and environmental degradation. By imposing a tax on these producers, the measure incentivizes sustainable practices, such as using recyclable materials and implementing recycling programs. Additionally, the tax encourages brands to design garments with end-of-life plans, ensuring that products can be recycled, repurposed, or composted instead of ending up in landfills. This initiative seeks to promote more responsible production and consumption in the fashion industry.

textile waste is not only managed more effectively but also transformed into valuable resources through innovative processes domestically.

Education and public awareness are also vital. Integrating **education about textile waste, circularity, and heritage crafts** such as papermaking into high school curriculums can offer students valuable insights into the application and innovation of these skills in a contemporary context. For young designers, **makers programs** run with local industry, design studios, and schools can help build sustainability into their practices, much like the programs supporting behavioural change currently run by Yodomo. Jim from Two Rivers Paper also mentioned to the Fellow that though they are not an educational institution, they are open to teaching and sharing their knowledge with those who ask. The Paper Foundation has also created an **apprenticeship program** in order to train the next generation of master papermakers and continue the tenuous chain of knowledge.

Council-run textile collection and recycling initiatives are essential. Since taxes already cover the recycling of plastics, glass, and paper, expanding this to include textile waste would address the rising demand and increase in textile waste. Local councils have the power to implement sustainability and recycling initiatives at the community level. As Sophie from Yodomo mentioned, there are active individuals within councils in London pushing for behavioural change around waste, not just for businesses but also for residents. This includes the simple first step of changing the perception of waste from something dirty to something potentially clean and reusable.

Funding is another critical aspect. Many businesses involved in recycling and sustainability cite funding as a major hurdle in their operations. Providing adequate funding can reduce the risk of burnout and ensure the continuation of their valuable work.

To further promote behavioural change, education and initiatives that **share knowledge and skills** related to mending and reusing are necessary. Reducing consumption must go hand-in-hand with resource recycling and circularity. Educating businesses and consumers is crucial to changing mindsets and decoupling economic growth from resource use. Educating consumers about where their goods come from and supporting repair, care, and community can foster a more sustainable approach. As Kae Katz, founder of FibreLab, says, “If people can come here and see how difficult it is to sort waste and how much labour goes into shredding it and how much thought goes into making it into a new product, then maybe they would think twice before buying something that they’re going to throw away.” Giving young people the chance to experience the labour and time involved in making and recycling products could significantly promote behavioural change.

07
Conclusion

This fellowship provided the Fellow with the opportunity to learn about the history and tradition of rag papermaking, and to connect it to the contemporary context of fashion and textile overproduction and waste. The Fellow visited six sites of relevance, including two papermakers (in Northern and Western England), two textile recyclers (both in London), and two archives of material knowledge that hold evidence of the broad application of paper to everyday life (in Athens and Manchester). She also had the opportunity to present her fellowship context, initial findings, and research intentions on three occasions overseas during two talks (Basel and Rome) and a residency/workshop (Athens). Upon returning to Australia, she has been invited to speak about the fellowship learnings to an academic and general audience.

During the fieldwork, the Fellow identified key themes that emerged at the sites, as well as ways of categorizing the knowledge gathered. She also connected the skills enhancement areas related to handmade rag paper production to the larger issues and contexts of clothing recycling.

Until undertaking this fellowship, the Fellow's area of expertise was situated firmly on the topic of the Eastern, specifically Japanese, heritage of papermaking. This fellowship provided her with a valuable opportunity to broaden her knowledge and network and make important historical and intellectual connections that will provide the basis for future research and impact on the sector.

08
References

Pichou, Myrsini. 2020. “The ATOPOS cvc RIPPING Project: A ‘New’ Life for Dress Objects?” Costume 54 (2): 242–64. https://doi.org/10.3366/cost.2020.0166.

Miyake Design Office. 1985. Issey tachi: Issey Miyake & Miyake Design Studio 1970-1985. Obunsha.

09 Appendices

APPENDIX 1

Making a sheet of handmade rag paper[19]

The following is a simplified description of how to make a handmade sheet of rag paper.

Making pulp

Once the rags are sorted, cut, and fermented, they are beaten into a pulp. This was done first with a stamper, and then later in history was completed with a Hollander-style beater.

Figure 57. A Hollander-style beater beating linen rag pulp at Two Rivers Paper Mill

19 Please note that these steps are generalized, and differ sometimes drastically from mill to mill and throughout history

The stamper

Stampers were giant hammers lifted by the power of a water mill. The hammers, all shaped differently to pulp the rag in different stages, would be raised, then drop into a stone trough filled with water and pulp. Water for these troughs was brought through from the river.

The beater

A Hollander-style pulp beater is a key machine in the papermaking process, designed to transform raw materials like cotton or linen fibres into pulp suitable for paper production. It consists of a large, oval-shaped trough filled with water where a heavy beater roll with (semi-sharpened) blades rotate against a stationary bedplate, effectively breaking apart the rag fibres that are added in. The Hollander-style beater does not macerate the rags. Rather, it uses this mechanical shearing motion to first separate the weave of the cloth, then untwist each individual strand, yarn, or thread in the weave, and then finally uses friction to stimulate each fibre, releasing fibrils that will ultimately link together in the final sheet of paper. This process increases the surface area and hydration of the fibres, enhancing their ability to bond when formed into paper. The intensity and duration of this beating process can be adjusted to produce the desired pulp characteristics, influencing the paper's strength, smoothness, and absorbency. Once the pulp reaches the required consistency, it is discharged from the beater trough for further processing or direct use in paper formation. This precise control over fibre quality makes the Hollander beater essential for traditional and fine papermaking.

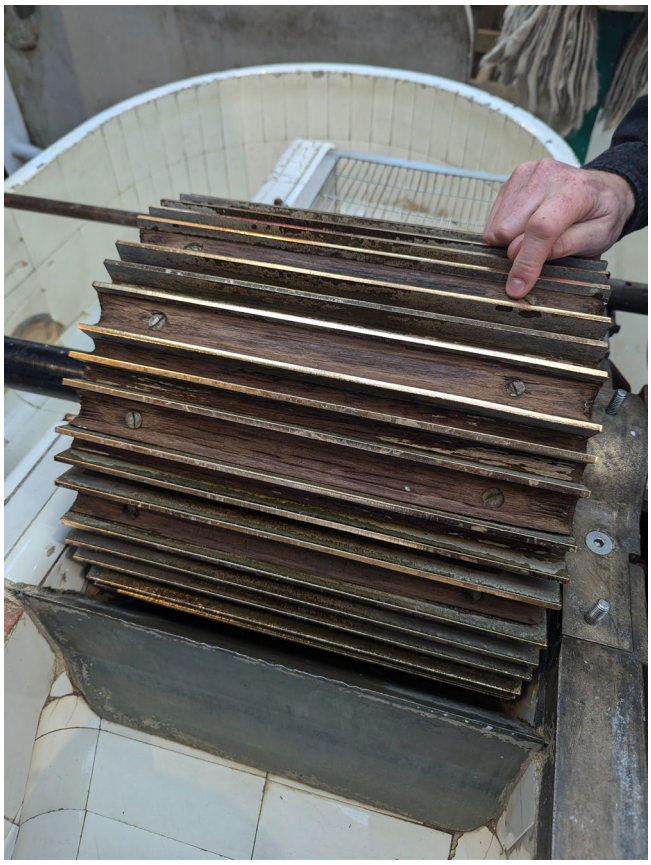


Figure 58. The beater roll in an antique Hollander style beater at the Paper Foundation. This one, unusually, has wooden slats between the metal blades

Figure 59. A Hollander-style beater at the Paper Foundation

Forming the sheet

The pulp, or “stuff” was stored until needed. When it was ready, it was introduced to a vat, operated by the ‘vatman.’ This vatman would use a mould and deckle to scoop up the beaten pulp suspended in water, check the consistency, then pull a real sheet once he was satisfied. After the scoop s/he would give it a little shake, then let the water drain out. After forming a sheet in this manner, s/he handed the mould to the ‘coucher’ (pronounced ‘koo-chur’). The coucher leant the mould up against a small post called an ‘asp’ to drain. Then, by placing it face-down and using a kind of rolling motion s/he would carefully transfer the pulp onto a dampened woven cloth called a ‘felt’, and layer them up in a neat pile. The vatman and the coucher would exchange two moulds back and forth until all the pulp was used. The result would be a ‘post’, or stack of paper.

Figure 60. Zoe Collis from Two Rivers Paper Mill forming a sheet. She is standing in front of a vat of pulp

Figure 61. The vat at the Paper Foundation

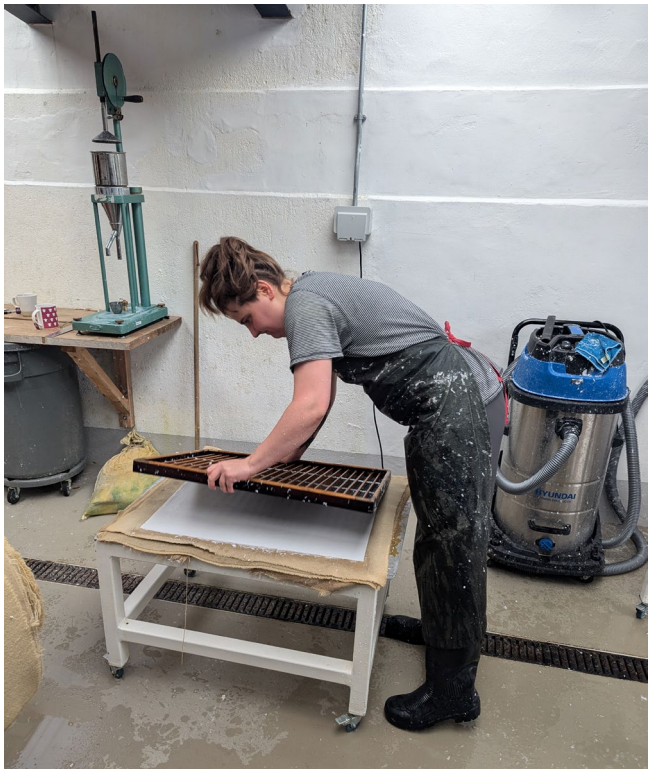


Figure 62. Papermaker Sam Newby couching a sheet of paper at the Paper Foundation

Pressing

The complete post would be moved under a huge wooden screw press. A block of wood was placed on top of the pile and the handle was turned to squeeze as much of the water out as possible.

Figure 63. A hydraulic paper press at the Paper Foundation, pressing a stack of sheets of freshly-made paper while they are still attached to the felts

Figure 64. Papermaker Sam Newby at the Paper Foundation setting a post of paper for its second press in the screw press, after they have been removed from the felts

Drying

Another member of the team, the 'layer,' separated the sheets from the felts. They laid the wet, pressed sheets of paper in one pile and the felts in another, ready for the coucher to use again. Sheets of handmade paper are often dried stuck together in pairs to prevent curling and warping by balancing drying tensions. This method ensures even drying, protects the delicate surface texture, and is more space-efficient. Rooted in traditional practices, pairing the sheets helps maintain the high quality and consistency of handmade paper, making the overall production process faster and more effective.

The wad of wet sheets was carried up to the top of the mill to the drying loft, a few at a time. The drying loft had shutters to control the amount of airflow. Rope drying lines crossed from side to side to hang the wet paper over. Now, most mills use a drying room with fans, and/or marble racks.

Figure 65. Papermaker Sam Newby from the Paper Foundation demonstrating the laying process of removing the pressed, damp paper from the felts and stacking them in pairs, or 'spurs'

Figure 66. Sheets of handmade paper hanging to dry in a marble rack at Two Rivers Paper Mill

Figure 67. Sheets of handmade paper stacked to dry in a fan-forced drying cabinet at the Paper Foundation

Sizing

As soon as the paper was dry it would be ready for ‘sizing’. Different mills had their own recipes for size. Rice and wheat starch can be used, as can gelatine obtained from boiling bones, skins, and hooves of animals. The sizing is either spread on with a knife, brushed on, or even dipped. The paper is then dried again.

Polishing

One of the final stages in handmade paper production would be to smooth the fibres and create a suitable surface for art, writing, or printing. This was done with a smooth pebble or stone such as agate to give an even surface. This is not always done.

Figure 68. (Left) A stone tool with a wooden handle used for polishing paper, used at the Paper Foundation. (Right) Sam from the Paper Foundation demonstrating the use of the stone polishing tool.

Quality Control

Spurs (pairs of two sheets dried together) are separated, and sheets are checked one at a time, specks are removed, and they are graded according to quality.

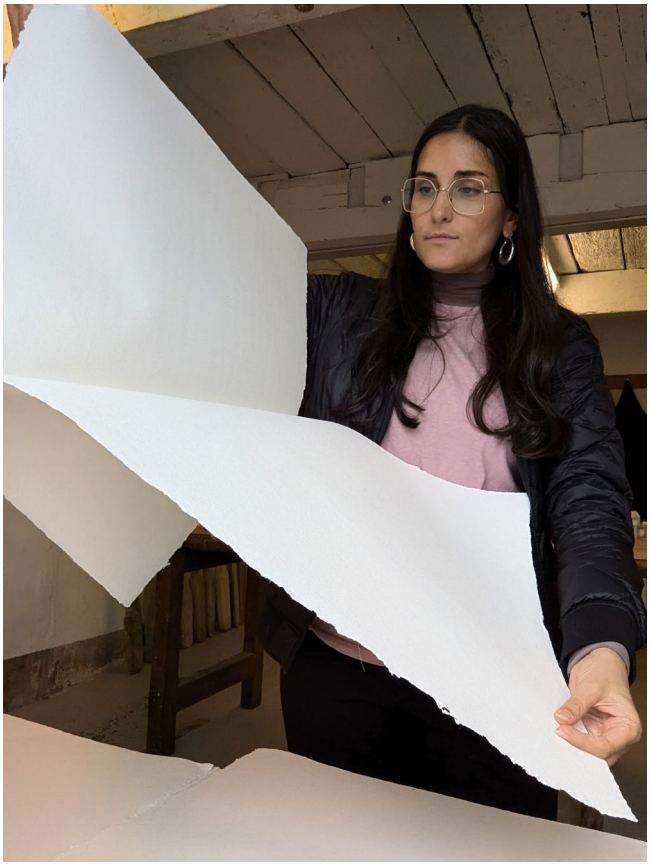
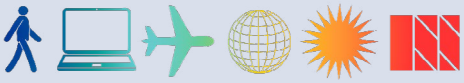


Figure 69. The Fellow separating sheets of dried paper and stacking them for further quality control

In all, the mills were damp and the conditions were hard in the old days, though now things are much easier. Men, women and children worked in the mills and one vatman could produce up to 4,000 sheets per day. Now, some of the labour has been made easier with modern tools, practices, and methods, but the work is still very physical and requires many stages to complete. It is result of an immense amount of oftentimes difficult labour to produce a smooth sheet of white paper for writing, printing, and a vast array of other possible uses for everyday life.



International Specialised Skills Institute

est. 1991