SHTUFF

MAKING NEW SHTUFF, WITH OLD STUFF.

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PRODUCT DESIGN BA (HONS)

CONTENTS

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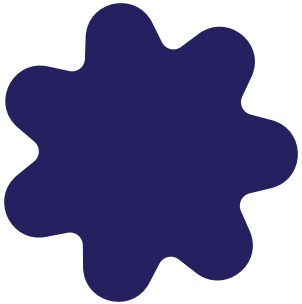


IN ORDER TO TACKLE TEXTILE WASTE, I HAVE CREATED SHTUFF. SHTUFF TACKLES TWO ISSUES: FAST FASHION AND FAST FURNITURE.

I HAVE DEVELOPED A TEXTILE FOR UPHOLSTERY WHICH USES UP SHREDDED TEXTILE WASTE, DIVERTING IT FROM LANDFILL AND TRANSPORT AROUND THE WORLD. ALONGSIDE THIS, I HAVE DESIGNED SUSTAINABLE FURNITURE FOR UPHOLSTERY WITH MY TEXTILES.

WHY AM I INTERESTED IN TEXTILE SUSTAINABILITY?

I have always been passionate about textiles. At the age of 10 I was gifted my first sewing machine, and over the following years I spent hours holed up in my room with my machine and schemes to make things. I was always stubborn and wanted to do things 'on my own' without help, and so forced myself to learn to sew through **failure**. I learned when fabrics stretch, when they definitely don't; that you should wash materials before sewing them (otherwise you end up with clothes made for mice); how you can break a machine needle; what 'quality' material tangibly means, and much more... I learned a lot over a decade of trial and error, sometimes giving up, but always picking it up again, eventually.

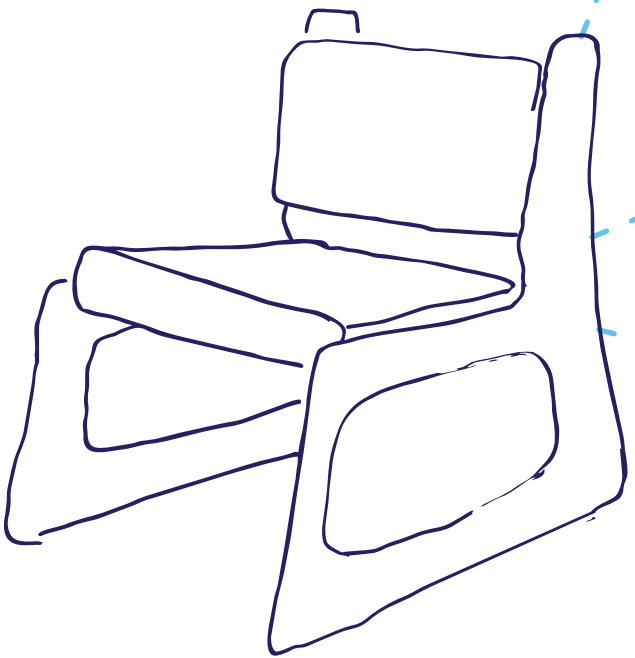
After many years of this, there was a day I hit a turning point and produced something that looked like it could have been bought in a shop, and **everything changed for me**. My desire to perfect my skills opened up into a **wider interest in fashion and textiles**. I started to look for answers: where are textiles made? How are they made? What is textile history? What happens when clothes are thrown away? With the help of books, the internet and museums I learned a lot: the wonderful, and the bad. Knowing all of this I have become an advocate for textile sustainability.

Although I am an advocate for sustainability, I am not interested in lambasting anybody for their purchases or beliefs: I am an advocate for **education, intelligent design, responsible production, and transparency.** Once I learned how garments are made, who makes them, and in what quantities, I couldn't look at an H&M shop quite the same. From this: Shtuff was born.

ALL ABOUT THE MATERIAL:

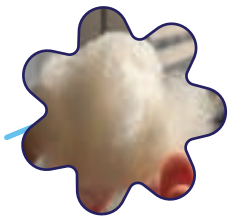
THE ANATOMY OF SHTUFF

'Shtuff' encompasses two things: sustainable textile design for upholstery sustainable furniture for it. Shtuff textiles and furniture are designed to be **beautiful and functional, whilst using materials responsibly**. For this reason, all of the materials used to make my furniture are carefully considered. My furniture is made up of three key materials: **textile waste, wool, and plywood.** In the following pages you can find detailed backgrounds on where these materials come from, and why I have used them.



TEXTILE WASTE

The pockets on the upholstery casing are stuffed with shredded textile waste. Additionally, the inner cushion inserts are also stuffed with shredded textile waste.



WOOL

The upholstery casing is knitted from lambs wool yarn. To ensure the cushions are springy and comfortable, some wool roving has been incorporated into the textile mix in the inner cushion stuffing.

PLYWOOD

The chair is made from sustainably sourced birch plywood. The design of the chair reduces material waste as the components can nest together tightly when cut during production.

MATERIAL BREAKDOWN

TEXTILE WASTE FUNDAMENTALS

HOW MUCH IS THERE, AND WHERE DOES IT GO?

I started this project by researching the problem: I was aware that textile waste was a complex and tangled issue, so it was important to me to fully grasp the extent of it. I began this research in the first semester of my final year, however this research consistently unfolded throughout the whole process of the project.

From this research, I derived the essential facts: the textile industry accounts for about 2% of the world's economy, yet it is the fourth largest user of raw materials and water [3]. In addition to this, approximately **£140 million worth of wearable clothing** is disposed of in landfill sites in the UK each year [4]. Around **80% of clothing waste globally goes to landfill, or is incinerated**, and around 20% is collected for re-use and recycling [5]. The use of 'textile recycling' is advertised by fashion brands in a dubious way, as recycled PET is typically derived from plastic bottles [6].

In the UK, clothing is frequently donated to chairty: of this, some is sold, some is sent to landfill, and **70% is collected for distiribution across the globe** [2]. Some researchers suggest that this distribution has a negative effect on the textile industries of the importing countries. This has been noted in particular in Sub-Saharan Africa, which imports a third of all globally donated clothes.

WOOL: FLEECES AND YARNS

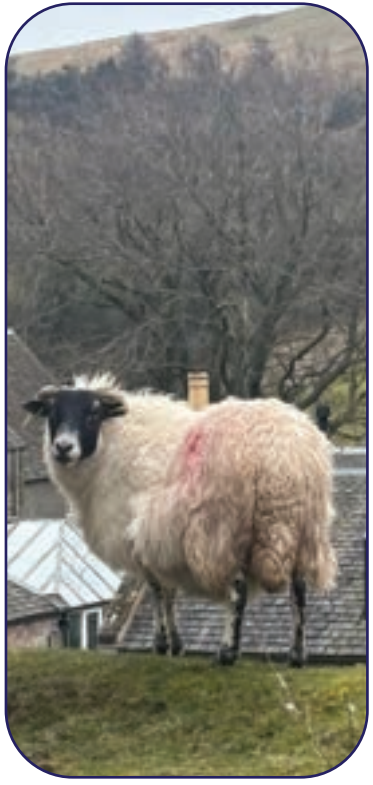
WOOL'S STORY, MATERIAL VALUE, AND MY RATIONALE

During my initial research into textile waste I took a particular interest in wool. I was aware that wool was wasted, and in order to understand why I delved into the history of natural and synthetic fibre production. Synthetic fibre production exploded in the 1950s: materials such as nylon and acrylic offered ease of care to consumers. They are durable, stain resistant and washable at high temperatures [7]. This boom was met with a decline in the use of wool. In 1950 fleeces sold at £14 per kilo, however today they are sold at £1 per kilo, which doesn't cover the cost of shearing [8].

Today, huge amounts of wool is wasted. Raw, unprocessed fleeces are bought almost exclusively by the British Wool Association, meaning there is no competitive market pricing. It often costs farmers more to transport their wool than they get paid for it. As a result, wool is burned, buried, or left to rot in many cases[9]. **This is unfortunate, given what wool can do: it is a wonder material.** Wool's fibre structure gives it thermal properties that mean that mean it insulates incredibly well, but is equally as breathable. It can also work to cool people down when they are hot.

The processing and making of any fibre has ecological consequences. The processing of wool can cause a degree of water pollution, however comparatively to synthetics, it is considerably less damaging[10]. The key factor to consider with wool is what happens when it's life is over. If wool is composted, it acts as a fertiliser, and fixes carbon in the topsoil rather than releasing it into the atmosphere [11]. One must note however, that we must have systems in place to facilitate this composting.

Within my work, I aim to **address textile waste**: based on my research, I decided that where new material was needed I would ensure that these are suitable, sustainably sourced materials: and thus I chose wool.



FAST FURNITURE

RENEWABLE MATERIALS AND DESIGNED OBSOLESCENCE

Having researched textile waste extensively, I came to the question of what to do about it. I experimented with a variety of ways of using, up-cycling and recycling textiles, and had the idea to use textile waste in upholstery. Within my work, I aim to be sustainable holistically, so **the decision to work with furniture was based upon my research into the fast furniture industry, which in many ways has echoes of the fast fashion industry**. Further to this, I saw upholstery as an opportunity to reduce micro-plastic pollution: when synthetic textiles are washed micro-plastics shed and can end up in waterways: by incorperating synthetic textiles into furniture, I am able to take these waste synthetic textiles out of the washing cycle, thus reducing microplastic pollution.

Consumers are **throwing out more than 12 million tons of furniture a year** [12]: affordable 'fast furniture' is manufactured quickly. This is done using quick, affordable maufacturing techniques such as spray adhesives, load bearing screws, and petrochemical foams . These materials and techniques have functional and environmental consequences. **The furniture is designed for obsolescence**: it cannot be disassembled, breaks more easily and cannot biodegrade when disposed of. The furniture does not last physically, and on top of this the fast turnover of style trends means the furniture is not designed for longevity aesthetically either.

In response to this, I have designed my furniture so that it can be disassembled, using fixings such as bolts, screws (non load bearing) and staple fixings. My furniture is made of renewable, sustainably sources birch plywood; and replaced petrochemical foams and stuffings with repurposed textile waste.

UPCYCLING

Low waste nested pattern
Needs good quality fabric

SMOCKING

Adapts existing clothing
Limited use

MODULARITY

Less need for more clothes
Narrow application

LABELS

More consumer awareness
Limited adoption

QUILTING

Uses layers of waste
Maybe limited application

WAXING

Added stiffnes
Requires natural fibres

FELTED FURNITURE

New application for felt
Needs technique refinement

COMPOSITES

Uses waste at scale
Non-eco resins

GOING BROAD
PROTOTYPING

In the early stages of experimentation, before designing sustainable furniture and upholstery, **I experimented with a variety of ways of re-using waste textiles.** I started by experimenting with ways of upcycling (clothing, modularity, smocking), however I felt that there was a limit to how far these experimentations could go as they required materials to be largely intact and usable. Following this, I worked with ways of using textiles for alternative purposes, experimenting with hardening and manipulating textiles. I tried waxing, quilting, making composites, and felting. Within each of these experiments there was room for development and refinement as the techniques were not perfect. I was particularly interested in the composites and felted upholstery as hardening the textiles opened up new possibilities for use in different products.

The composite materials were relatively successful, however after conducting further research on resins, hardeners and binders I learned that composite materials are rarely ecologically sound. Even 'eco-resins' aren't necessarily environmentally friendly. Based upon this, I started investigating how I could use textiles in areas such as furniture, **without the need to introduce a composite matrix.**

KNITTING DEVELOPMENT TENSIONS & YARNS

After my prototyping experimentation I moved towards knitting, and experimented with stuffing waste into knitted pockets. After a considerable amount of testing and refinement I decided to apply this to upholstery. **In this process learned how to use domestic knitting machines, first hand sewing pockets into the knitting, after which I learned how to making the pockets integral to the knitting on the machine**.

Having learned this technique I started testing different formations of pockets, and in order to create my final piece I had to establish what yarns would be possible to use. I had experimented using available synthetic yarns, after which I moved onto lambs wool. I tested on both 'chunky' machines which create larger knits, and 'standard' machines. For the purposes of upholstery I fine-tuned my settings for the use of a standard machine, using 2 strands of lambswool on a tighter tension. By doing this, the knit was fine and durable meaning it could withstand the wear it would receive as upholstery.

Standard machine
Synthetic yarn: 1 strand

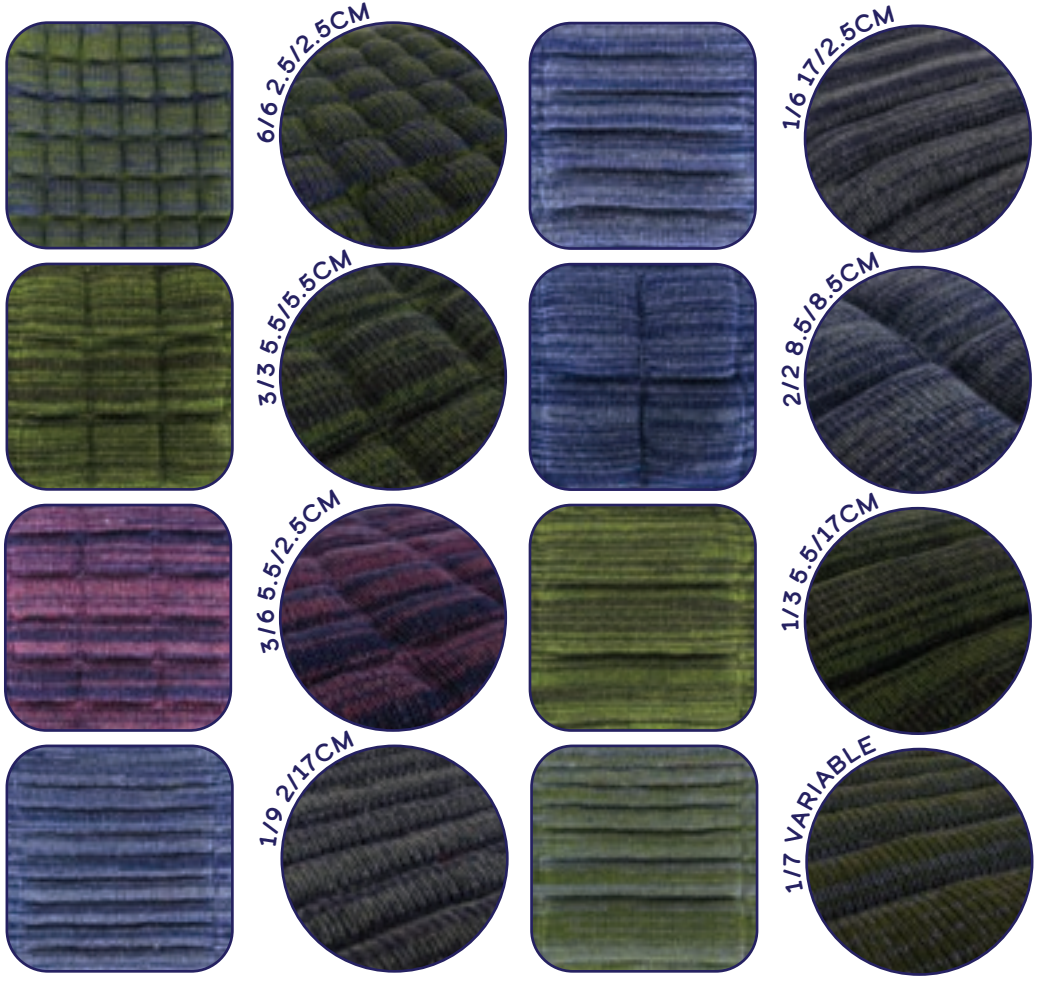
Standard machine
Mixed yarns: 2 strands

Chunky machine
Lambswool: 2 strands

Tension swatch
Lambswool

Standard machine
Lambswool: 2 strands, looser

Standard machine
Lambswool: 2 strands, tighter



SHTUFF SAMPLES

CUSHIONING AND AESTHETICS

In conjunction with my furniture I created a series of samples to demonstrate the varied effects that can be achieved with my knitting technique. I created my upholstery and samples using a **domestic manual knitting machine**. These machines are **not electrified, and require the operator to operate them manually (with force)**. Because of the manual labour that goes into using these machines, these pieces are time consuming to create and the knits must be monitored for quality as they are being produced.

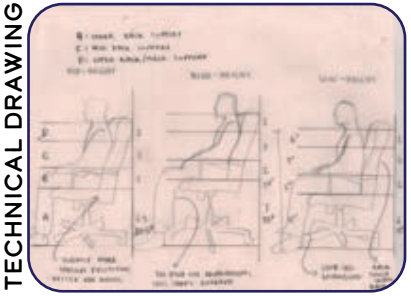
I have considered how the production of my work could be scaled up, and having spoken with knitting experts I understand that **the process could be automated at scale**. Within the wider knitting industry, electronic machines are able to automate many of the techniques used in knitting with the use of electricity and robotic arms.

CHAIR DESIGN PROCESS
DRAWING, PROTOTYPING, CARDBOARD

The iterative process of designing the chair was varied: I took my initial inspiration from mid century modern design, using smooth curves and simple but stylish silhouettes with the aim of it lasting stylistically. I based my work of standard dimensions for the body however I had to make various adjustments as I went alone, recuriting people to test my cardboard prototypes in creative ways: this allowed me to bring the idea to life without wasting material.

SCALE PROTOTYPING

TECHNICAL DRAWING



FURTHER DRAWING

TO SCALE PROFILE

ADJUSTING PROFILE

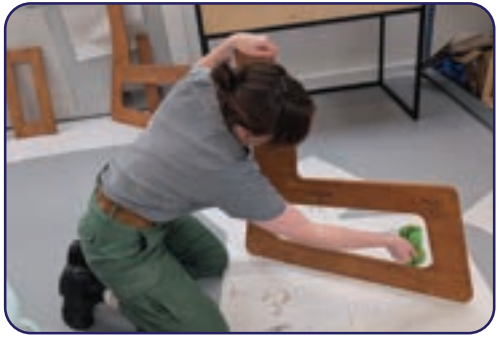
TO SIZE PROTOTYPE

FINAL PROTOTYPE

MAKING OF CHAIR

CUTTING, DRILLING, FINISHING

I used 18mm plywood to make my chair. I used a lasercut MDF profile in order to route out the shape of the side faces. I followed this by using a jig to route out the housing for the slats that run along the centre of the chair. I used a variety of techniques and tools during construction using cot bolts and bars to securely hold the chair together. I tested different stains and finally finished the chair with Danish oil. In creating this chair I had a huge amount of help and advice from the wood workshop technician Alan Ramsay.

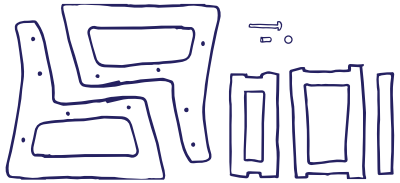


SHTUFF

MAKING NEW SHTUFF WITH OLD STUFF.

CHAIR ASSEMBLY GUIDE

1 WHAT YOU SHOULD HAVE

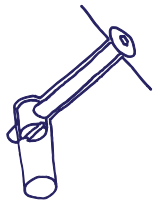


2 chair sides
10 bolt cap covers
Back bar

10 Pairs of cot bolts & bars
Back support bracket
Under-seat bracket

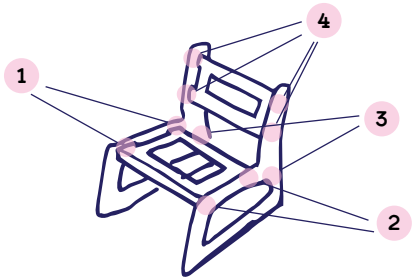
To start, check that you have all of your pieces (pictured here) and 10 pairs of bolts and bars.

2 HOW TO USE COT BOLTS



Insert the bar into the larger hole of each joint with the screw driver slit facing outwards. Using a screw driver align the bar so that the slit is parallel to the bolt which you insert through the other smaller hole. This means that the bolt and the threaded bar hole are aligned: use an allen key to tighten in the bolt.

3 THE ORDER TO SCREW IN YOUR BOLTS



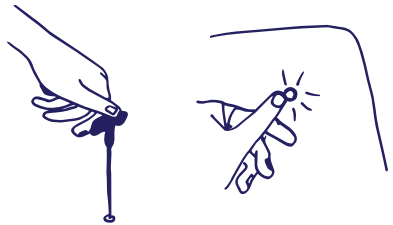
The under-seat bracket is best to start with. Screw in all the bolts in the order above.

4 THE FIRST 4 BOLTS

To attach the first four bolts place the seat bracket upright on the floor, and then place the side of the chair on top. This is the hardest part, and its best to ask someone to help!

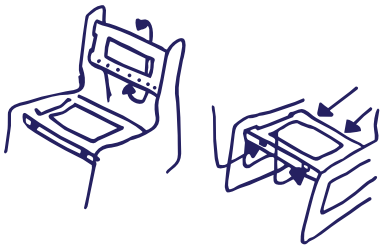
5 TIGHTEN

6 SNAP IN COVERS

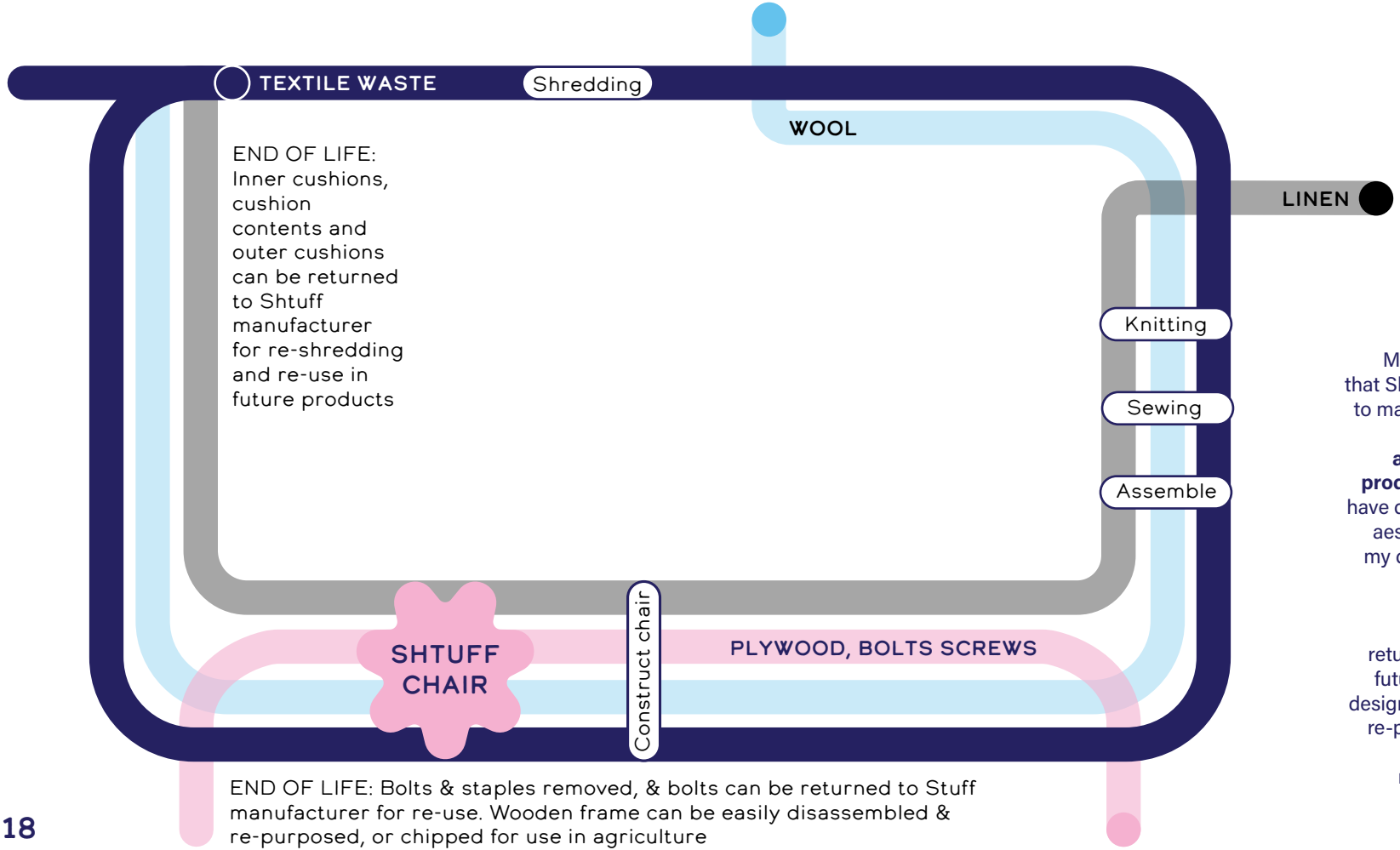


Once you have all of your bolts in, go through and tighten them all to ensure a secure fit. Next, snap the bolt covers into place by pressing them into the bolt holes.

8 ADD CUSHIONS



Finally, add your cushions by popping them into place using the pop studs on the cushions and the chair.



CIRCULAR

PRODUCTION, USE AND END OF LIFE

Materiality is the core of my work: to ensure that Shtuff products are sustainable I made sure to map out the circular life cycle of my product. **The key to this is considering and accommodating for what happens to my product when it reaches the end of its life.** I have designed my furniture to be physically and aesthetically durable, however I can't protect my designs from long term wear, and perhaps one day, breakage: **I have factored this eventuality into the design.** Damaged cushions and their entire contents can be returned to Shtuff for re-shredding and use in future Shtuff products, and the chair frame is designed to be disassembled. The wood can be re-purposed or chipped for use in agriculture, and the bolts, staples, and screws can be removed, and the bolts can be returned to Shtuff for re-use.

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