

DEVELOPMENT OF EC-FRIENDLY GARMENTS FOR CHILDREN

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ABSTRACT

Every garment that comes out of the factory has its own value over period, in order to understand the values of the garments, we must get to know the properties or how the garment is made. Every piece of the clothing undergone various types of testing and finishing methods to make them suitable and safe for wearing. There are a number of fibers from different sources like bamboo from bamboo plant, banana fibers etc., are converted into fabrics to make garments or any other types of objects used in day-to-day life. Not only these many varieties are invented in the industry these are also one big key for sustainable materials. Rather than usage of synthetic fibers and yarns that are chemical made using natural raw materials helps to maintain the sustainability to a certain level. Although these materials are already gaining popularity among people still it is less used and seen as garment compared to other materials like cotton, wool etc., in order to make eco-friendly clothing extra care is needed due to its environmental and sustainable production methods. through this project we will be able to understand the eco-friendly materials I, e bamboo (a main key in this project) and the finishing and testing process and the value of garment. This project aims to reduce the environmental impact of fashion industry and to create high quality garments that promotes the usage of sustainable materials.

Keywords: Sustainable material, bamboo

INTRODUCTION

Development of Eco-friendly garment for children – Bamboo fabric. Through this project the main element used in this is bamboo and goal of the project is to promote sustainable elements or materials and to produce eco-friendly garments using natural and chemical free materials for the garment. Considering the present inventions and varieties of technologies in the industry we seem to find this fabric rare unlike cotton and other synthetic resources we used to make garments and other products. Bamboo is well known natural raw material that can be converted into fiber/fabric with different ratio like 50% bamboo and 50% lycra, 90% bamboo and 10% cotton etc., these materials have lot of different properties like bamboo or bamboo charcoal fabric has natural anti-odor property which can absorb moisture and sweat that can make the user comfortably wear them. On the design part the main inspiration is shades of pink and the focused on children's garment. Recent days the mindset of people has been changed a lot they expect varieties of prints, colors etc., to wear this is one another reason why we invented this design which can be added as another piece to their closet.

PROBLEM STATEMENT:

The demand for eco-friendly garment is keep on increasing as customers become more conscious towards the negative impact that production can have on planet. One potential solution is the usage of bamboo fabric. The fabric is not only durable but also has different properties like natural anti-odour etc., this not only absorbs moisture but also soft and durable making it safe and comfortable for children but however the use for the bamboo and bamboo blend fabrics are not widespread among the children's clothing as the availability and cost is high and in demand. i.e., there is need for more research and development in the area of using such fibres as fabric and making as product to make use of them in children's clothing as more feasible and accessible.

- **IMPORTANCE OF ECO-FRIENDLY CLOTHING:**

When the garment is eco-friendly it not only helps with reducing pollution, wastages etc., it also helps the society. Usage of sustainable or natural chemical free raw materials can lead to contribution in greater good for our planet. These garments made from sustainable materials are not only high in quality but

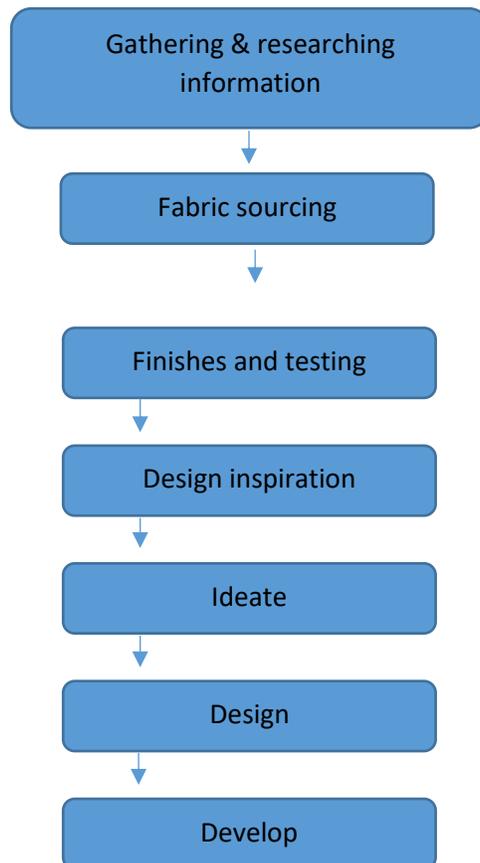
also helps with reducing lot of damages caused by unwanted landfills etc., the material used to make eco-friendly garment in this paper is bamboo.

- **PATTERN MAKING**

Pattern making is one of the important and main step in developing a garment. As the design collection are focused on children the fabric used was bamboo-lycra which was little difficult with sewing. The books on how patterns making is done and the sewing machine works for different materials helped us to make the final output.

METHODOLOGY:

The word 'methodology' refers to set of procedures or set of study methods in brief in-order to carry out the entire process and complete them. Choosing right method is important for any task. In this the focus is on making the garment eco-friendly or by using eco-friendly materials for children.



The research for this started from raw materials from various papers to pinterest and other popular sites for design inspiration. The inspiration taken to create them is taffy pink with this color as inspiration the inspiration and mood board was developed. The mood that was decided for this to be fun and bright.

Now, for the ideate and design phase I.e., once the design inspiration stage was done a set of rough sketches was developed to explore different ideas , when the rough works are done out of the sets developed a total of 3 sketches are finalized as final garment sketch.

In deliver stage, pattern making process with the measurements and execution of garment such as sewing process and other sources like trims and accessories were done.

MATERIALS:

To make the garment a list of materials or tools were used:

1. Bamboo-lycra fabric
2. Pattern sheets
3. Sewing threads
4. Bobbin and bobbin case
5. elastic
6. Flat Lock sewing machine
7. Measuring tape
8. shears
9. French curve
10. Pattern marker or chalk
11. Seam Remover

- **INSPIRATION BOARD AND MOOD BOARD:**

An inspiration board is nothing but a collage of samples or texts or images etc., the inspiration used to create the board here is taffy pink. The colour pink usually represents compassion, kindness, understanding etc., this gives a very fun and cheerful playful vibe to the garment.

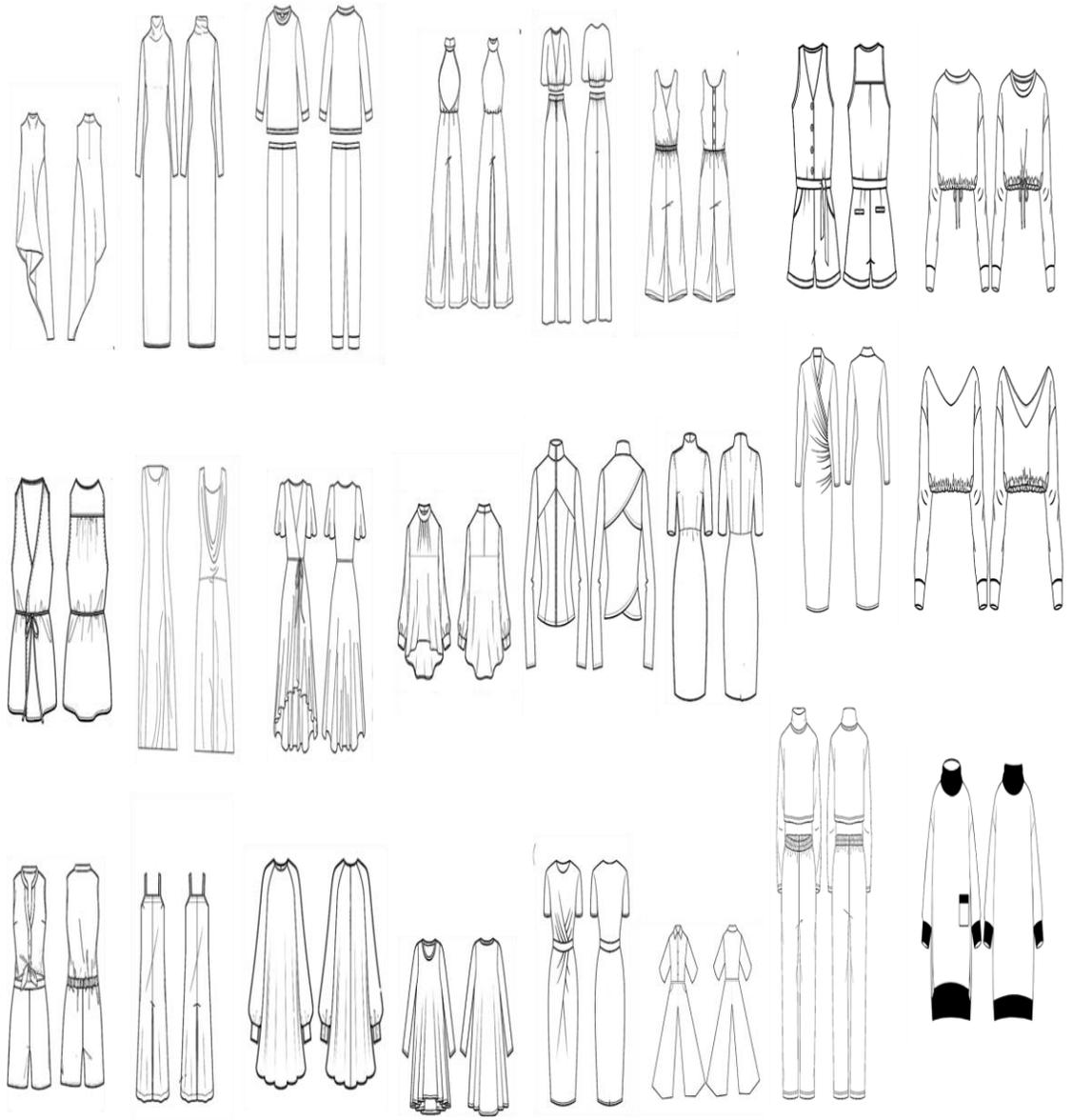
A mood board is a collage of images, swatches, colours etc., is used to convey mood and concept ideas visually. It is a designed or put out in such a way to convey the whole mood of the garment or specific style. Here the mood board represents the mood of our collection.



(Figure 1: Inspiration board and Mood board)

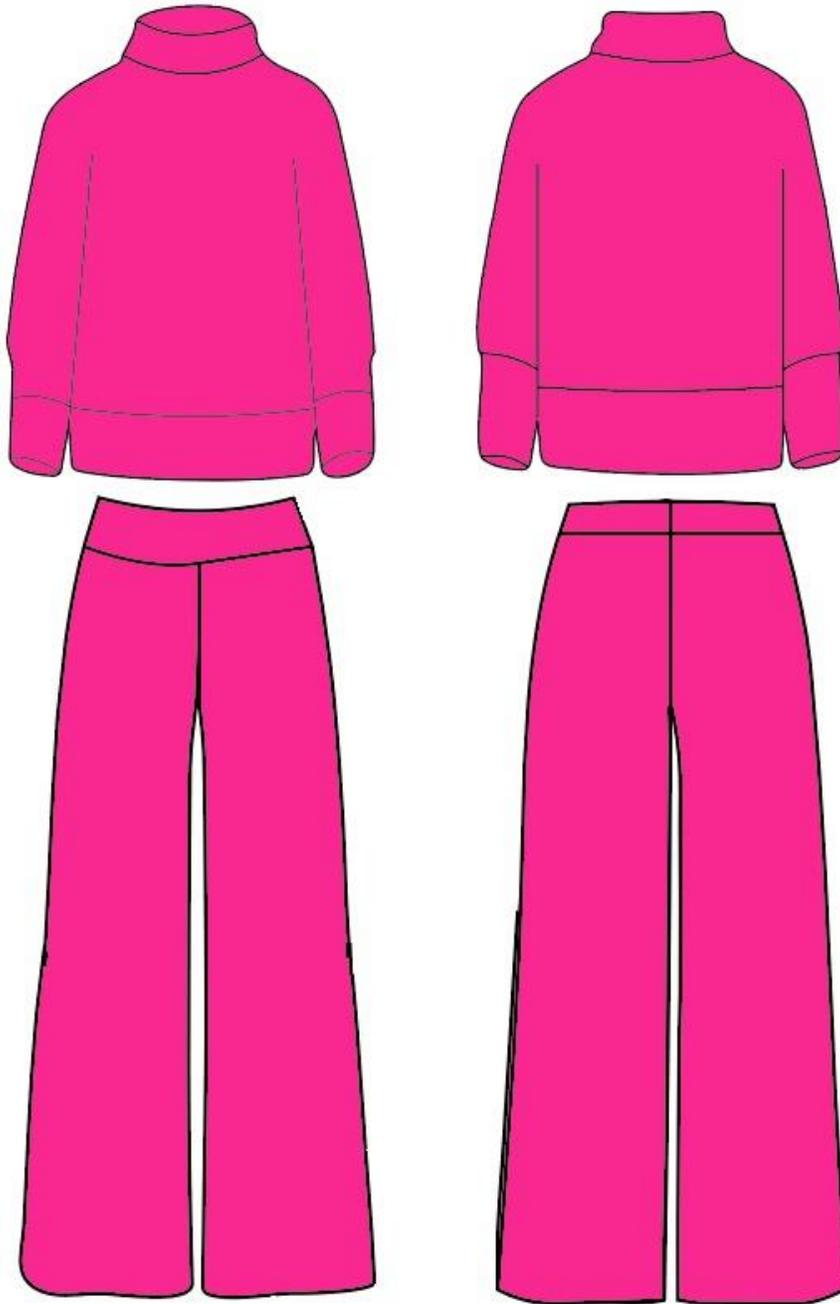
ROUGH SKETCHES:

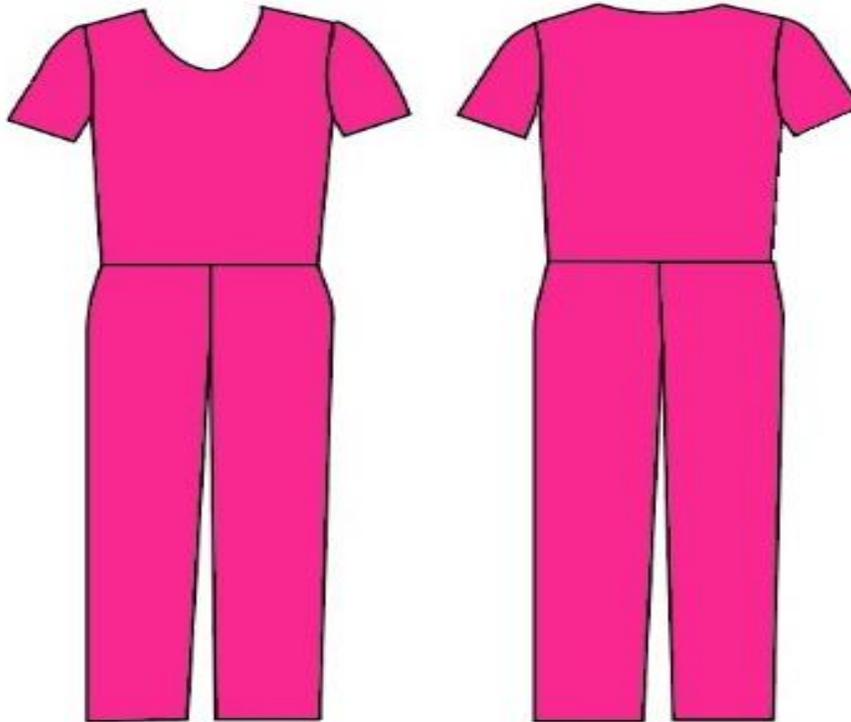
Rough sketches are an essential tool in designing a garment as it helps to vision the result we want and helps to explore a lot of ideas before proceeding with final garment design.



(Figure 3: Rough Sketch's)







(Figure 4: Final sketches with fabric colours implementing designs can be done according to the need of client)

Once the final sketch is done the next stage that comes is pattern drafting, this helps with analysing the fit, design, styles etc., for the garment. With the final sketch comes the fabric sourcing in this stage type of fabric that will be used, GSM, weave, blends etc., can be checked according to one's need. Here the tailoring or sewing process is done by starting with taking the client's measurements using the measuring tape and transfer them into the pattern sheet including the ease and seam allowance to draft the pattern for the required garment. Once the pattern drafting is done in the sheet it can be transferred on the fabric and cutting process will be done. Now the fabric will do for sewing. For the sewing process flat lock machine has been used as the fabric is knit and overlock machine is used to cover and close the edge of the garment. If button is necessary button machines can be used.

FINISHING PROCESS:

For the textile part of the report the finishing was done and apply to the fabric. The finishing done here is antimicrobial with aloe vera. The process is to give various finishes. Aloe vera is natural element that has lot of properties which includes heals and soothes the skin, has anti-microbial properties etc.,

Materials required:

1. Aloe Vera extract
2. Citric acid
3. Heating Mandle
4. Weighing scale
5. Beaker
6. Reactive dye (cold/hot)
7. Aluminum foil / glass top

STEPS:

Now, to dye the fabric with the help of same weighing balance measure the Glauber salt, soda ash and Reactive dye (Cold/Hot) according to the requirement. Now take a tumbler or vessel according to the fabric size that going to be dyed. Mix the Glauber salt, soda ash in the water and add the reactive dye into the water, dip the fabric into the tumbler. Place the vessel or tumbler into the dye bath around 60 minutes at 80 degrees Celsius once when the time went off take the fabric out from the dye bath and wash it with cold water and let it dry.

Dipping Method (Microwave):

Once the fabric is dyed, start cutting the fabric sample of 10cm x 10cm and measure its weight in electronic weighing balance and record its value, now extract 50mL of aloe vera extract and convert them into liquid form. Now measure the citric acid on the weighing scale for 0.38g. now mix the aloe vera extract with citric acid and place them in a beaker. Now dip the fabric in the extract and set them in the microwave for 20min at 80 degrees Celsius. Once the timer went off take the fabric out from the beaker and place them in a glass plate or petri plate

and place them inside the microwave oven again to dry the fabric. Set the temperature at 180 degrees Celsius for 5 minutes now, take the fabric out from the oven and scrape the dried aloe vera on top of the fabric gently.

ANTIMICROBIAL FINISH:

Material required:

1. Sample fabric
2. Culture - E. coli
3. Petri Plates – 4
4. Conical Flask – 1
5. Media – Nutrient Agar

First step in this process is to measure the Nutrient Agar in a weighing balance. Take Nutrient Agar of 1.4 g for 50mL of distilled water.



The media has been prepared and a cotton has been plugged in order to avoid entry of foreign microorganisms. Now for the second stage take both the media and petri plates and wrap them for sterilization process. The both media and petri plates were sterilized for around 45 minutes once the sterilization process is over wrapping the media and petri plates which is done to help kill biological agents.



media

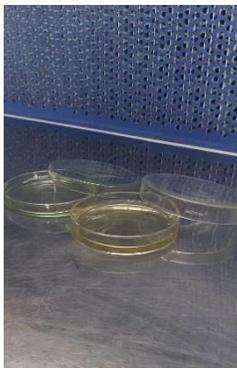


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Sterilization process

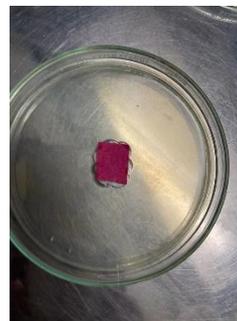
Now, the media is poured into petri plate to solidify. When the media is solidified the well-cut process begins when the well cutting process is done place the finished fabric on them.



Solidifying process



Well cutting process



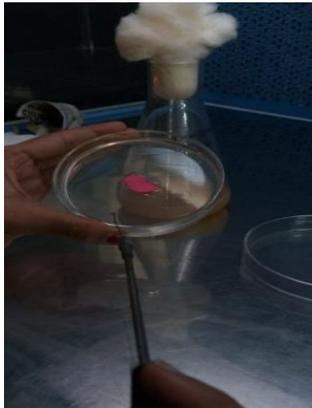
next stage is loop heating, The loop was heated in the lamp and were dipped into the E coli culture thus, the striking method was done. Once this process or step is done the plates should be kept for incubation process, where after the inoculation step the plates were kept in the incubator at 37 degrees Celsius for around 48 hours in order to check the antimicrobial activity.



Loop Heating process



E coli culture



steaking process



Incubation process

TESTING PROCESS:

1. GSM:

GSM stands for Grams per square meters and it is used to measure the weight and density of the fabric. In order to find the GSM of the bamboo lycra fabric, step one is to cut a small piece of fabric within 100 sq.m using the scissors which you want to measure. With the help of electronic weight machine place the fabric sample on the machine to determine its weight in grams. To calculate the GSM, use the formula which is $GSM = (\text{weight of fabric in grams} / \text{area of fabric sample in square meters})$. To find the area of the sample measure its length and width using a measuring tape or scale. Now with the measured length and width multiply them in cm and divide them by 10,000. For example, if your fabric sample is 30 grams, now measure or take the length and width as 30cm now the area is calculated as $(30 \times 30\text{cm}) / 10,000 = 0.9 \text{ sq.m}$

2. CREASE RECOVERY:

Crease Recovery test is usually done to check the ability of how the fabric reacts to when it crease or folds. Cut a small piece of fabric sample of around 10cm x 10cm and place them on the creasing device (standard) in order to crease the sample fabric with specific load or pressure such as 3kg etc., now hold the crease for a specific period of time like 5 min and remove the crease once the time is over. Right when the crease is removed measure the length of the edge with a ruler and record the length now, again hold them and start the timer and again measure its length and record the value . now calculate the recorded value with the standard formula the higher the percentage the higher the crease recovery.

3. STIFFNESS TEST:

Stiffness test is usually done to measure the flexibility of the fabric. Here take a fabric sample of dimension 20cm x 10cm and set up the stiffness tester according to its instructions. Now, clip the fabric in the stiffness tester and make sure they are flat and taut and start by bending the lower arm of the tester until it touches the sample fabric and release them now record the maximum deflection of the sample and note them and

repeat the same step for around 4 to 5 times and record the values. Calculate the stiffness using its general formula

4. THICKNESS TEST:

The Thickness test is usually done to measure the thickness of the fabric. Start by cutting the fabric sample of dimension 10cm x10cm and set the thickness gauge according to its instructions. Now place the fabric in flat surface and with the help of the gauge measure the thickness of the sample at different points and record the measurements in millimeters. Now calculate the average thickness of a fabric by adding the taken measurements and divide them with total number of the measurements taken.

As per the standard procedure mentioned above the list of testing done on this report is listed in the below table.

Table: Fabric physical characteristics

S.No.	Test	Result
1.	GSM	149.0 g/m sq
2.	Thickness	5.3 mm
3.	Crease recovery	95 degrees
4.	Stiffness test	0.3 cm

FINAL OUTPUT:







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