

Natural fibres from plants

Cotton

Used for making jeans, T-shirts and towels and has the following qualities:

- ☛ cool to wear
- ☛ very absorbent, dries slowly
- ☛ soft handle
- ☛ good drape
- ☛ durable
- ☛ creases easily
- ☛ can be washed and ironed

Viscose

A regenerated fibre from natural polymer materials like cellulose. It is used for shirts, dresses and linings and has the following qualities:

- ☛ low warmth
- ☛ absorbent, dries slowly
- ☛ soft handle
- ☛ good drape
- ☛ not durable
- ☛ creases easily
- ☛ can be washed and ironed

Natural fibres from animals

Wool

Used for jumpers, suits and blankets and has the following qualities:

- ☛ warm to wear
- ☛ absorbent, dries slowly
- ☛ breathable, repels rain
- ☛ soft or coarse handle
- ☛ can shrink, should be dry cleaned
- ☛ good drape
- ☛ not durable
- ☛ creases drop out

Silk

Used for evening wear and ties and has the following qualities:

- ☛ warm to wear
- ☛ absorbent
- ☛ soft handle
- ☛ good lustre and drape
- ☛ durable
- ☛ creases drop out
- ☛ dry clean

Man-made/synthetic

Nylon (Tactel)

Used for active sportswear, fleece jackets, socks and seat belts and has the following qualities:

- ☛ warm to wear
- ☛ absorbent, dries slowly
- ☛ breathable, repels rain
- ☛ soft or coarse handle
- ☛ can shrink, should be dry cleaned
- ☛ good drape
- ☛ durable
- ☛ creases drop out

Polyester

Used for raincoats, fleece jackets, children's nightwear, medical textiles and working clothes and has the following qualities:

- ☛ low warmth
- ☛ non-absorbent, dries quickly
- ☛ soft handle
- ☛ good drape
- ☛ very durable
- ☛ crease resistant
- ☛ easy care
- ☛ can be recycled

Fibre blends

Blending different fibres together produces yarns that have the combined properties of each component fibre. Using fibre blends improves the appearance, performance, comfort and aftercare of fabric. Blending can also reduce the cost of an expensive fibre.

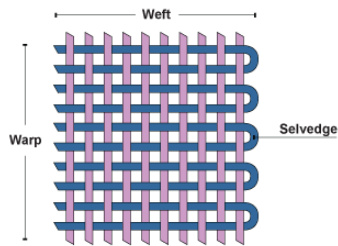
- ☛ **Polyester/cotton blend:** shirts are more easy-care and crease-resistant than shirts made from 100 percent cotton.
- ☛ **Cotton/lycra blend:** jeans are more comfortable, stretchy and fit better than cotton jeans.
- ☛ **Acrylic/wool blend:** trousers are less expensive than 100 percent wool trousers.

Modern microfibres

- ☛ **Elastane (Lycra)** is always used in a blend with other fibres. It is used to make sportswear, body-hugging clothes and bandages. It has good handle and drape, is durable, crease resistant, stretchy (more comfortable) and is easy care. It has low warmth and is absorbent.
- ☛ **Tencel** is a 'natural' microfibre made from cellulose derived from wood-pulp. It is used for shirts and jeans. It has soft handle, good drape, is breathable, durable, crease-resistant, easy-care and biodegradable. It is absorbent and has low warmth.

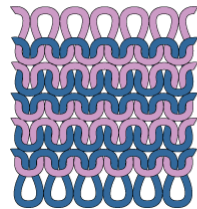
Woven fabrics

Woven fabrics are made up of a **weft** - the yarn going across the width of the fabric - and a **warp** - the yarn going down the length of the loom. The side of the fabric where the wefts are double-backed to form a non-fraying edge is called the **selvedge**.



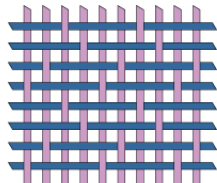
In plain-weave fabric the warp and weft are aligned so that they form a simple criss-cross pattern. Plain-weave is strong and hardwearing, so it's used for fashion and furnishing fabrics.

Weft-knitted fabrics



Weft-knitted fabric is made by looping together long lengths of yarn. It can be made by hand or machine. The yarn runs in rows across the fabric. If a stitch is dropped it will ladder down the length of the fabric. The fabric is stretchy and comfortable and is used for socks, T-shirts and jumpers.

Satin-weave fabric



In satin-weave fabric there is a complex arrangement of warp and weft threads, which allows longer float threads either across the warp or the weft. The long floats mean the light falling on the yarn doesn't scatter and break up, like on a plain-weave.

The reflected light creates a smooth, lustrous (shiny) surface commonly called satin. The reverse side is invariably dull and non-shiny. Weave variations include jacquard and damask.

Non-woven fabrics

Non-woven fabric is made by **bonding** or **felting**.

Bonding

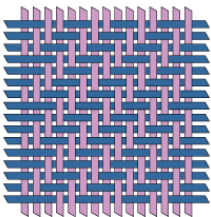
Bonded-fibre fabrics are made from webs of synthetic fibres bonded together with heat or adhesives. They are cheap to produce but not as strong as woven or knitted fabrics. Bonded-fibre fabrics are mainly used for interlining. They are easy to sew, crease resistant, do not fray and are stable when washing and dry cleaning.

Felting

Wool felt is a non-woven fabric made from animal hair or wool fibres matted together using moisture, heat and pressure. Felt has no strength, drape or elasticity but it is warm and does not fray. Wool felt is expensive. It is used for hats and slippers and in handicrafts.

Twill-weave fabric

In twill-weave fabric the crossings of weft and warp are offset to give a diagonal pattern on the fabric surface. It's strong, drapes well and is used for jeans, jackets and curtains.



Properties of fabric

Aesthetic properties	Functional properties	Comfort properties
handle	strength	absorbency
drape	durability	breathability
colour	crease resistance	elasticity
appearance	flame resistance	softness
	stain resistance	stretch
	water resistance	warmth
	aftercare	
	cost	

It is important to match fabric properties to the requirements of the product. For example:

- ☛ **Cycling jackets** need to be made from fabric that is warm, breathable, elastic, windproof and water resistant.
- ☛ **Children's jumpers** need to be made from fabric that is soft, colourful, stretchy, warm and easy care.
- ☛ **Seat belts** need to be made from strong, durable, flame-resistant materials.
- ☛ **Fire-protective clothing** needs to be strong, durable, flame resistant and water resistant. It may also need to be breathable and elastic.
- ☛ **Geotextiles** need to be strong and durable so they stop embankments from slipping.



Cycling jerseys need to be breathable

Smart Fabrics – react to the environment

Scotchlite reflective fabric - silvery effect, shines when a car's headlights reflect on the surface. Excellent for road runners, children walking to school in winter etc.

Microfibre - breathable, windproof & shower proof. Let's moisture out of the body and not into the body.

Chromatic dyed fabric - changes colour at certain temperatures, can be used for firefighters to warn of unsafe temperatures. Used on T-shirts in 1990s to show when sun was too hot/risk of sunburn.

Production
Job production / one off - Only one item is made, e.g. individually designed wedding dress, costume for a theatre show.
Batch production - Many identical items are made, e.g. school uniform.
Mass production - Very many identical items are made, e.g. shirt sold at M&S.
Continual flow - Production is non-stop, machines work 24/7. Used for simple products like making bandages. Unusual in textiles manufacture.
Costs - Fabrics, components (e.g. thread, buttons), labour (not just machinists, office staff, designers, cutters etc.), power (electricity), rent.
Standard minutes - How long it takes for a product to be manufactured, this helps to work out costs (labour).

Specifications
Design specification
 Must not be to do with the fabric (e.g. lightweight fabric).
 Good examples related to your theme would be:

- Big enough to fit
- Have compartments suitable to store
- Be suitable for / appeal to age.....
- Suitable for males/females/ unisex.
- Be adjustable to fit a variety of different sized people.
- Be comfortable for the wearer.
- Colour which will not look dirty quickly.
- Colour to match current fashion trends

Fabric specification - must be related to fabric not design!

- Washable
- Soft, comfortable fabric
- Hard wearing / durable
- Easy care / no need to iron
- Should not fray

Manufacturing specification

- Working drawing - line drawing without colour, includes measurements, including tolerances.
- Fabrics & Components to be used.
- Delivery date
- Flow chart - start & finish round boxes: process rectangle: decision diamond: check triangle.
- Gantt chart - production schedule
- Care label
- Equipment to be used & risk
- Photograph of product

Jobs: Designer- designs products. Pattern cutter- works out the pattern templates. Sample machinist- makes prototype. Cutter- cuts fabric. Machinists- sew product together. Presser- presses & irons product. Quality controller- checks product matches specification & is up to standard.
Quality Assurance - Procedures set up to prevent problems from occurring.
Quality Control - Checks product
CAM - Computer aided manufacture machines. CNC (computerised numerical control) - item is put into a frame & the machine is programmed to cut the fabric.
CAD - Computer Aided Design. Computerised design, e.g. try with long sleeves, short sleeves etc., design 'talk' can see the product from all angles, being worn by a virtual model.
 Other uses of ICT in textiles industry: Websites to attract possible ideas, Websites to attract customers, Email to show clients etc.
Methods of production:
Just in time - components & fabrics arrive just in time for the next stage. Less likely to be wasted fabrics and components.
Production line - one person does one job.
Team working system - Small teams of workers are multi-skilled. Not repetitive work.

Add more decorative techniques
 Smart or technical
 Fibres / properties
 Finishes

Specialist machines:
Spreading machines - spread fabric flat.
Vacuum tables - fabric is spread flat.
Die cutters - (like biscuit cutters) cut out pattern pieces.
Band saws - cut through many layers of fabric at a time. Operators wear metal chain gloves to protect them from getting cut.
Computer driven knives / saws - cutter is programmed to cut through the fabric.
Hot notcher - Makes notches in the side of a stack of cut out pattern piece. The notches help to match up which pieces go together.
Thread marker - shoots a bright thread through the stack of cut out pattern pieces - it is used in place of tailor's tacks, e.g. for marking dart points.
Industrial sewing machines - Most look like normal sewing machines, but may be specially designed or have attachments which make it easier and more accurate to perform the same repetitive task, e.g. it may have an attachment which feeds elastic through at a certain rate as the item is being stitched. The machines are very fast, many have automatic thread cutters, so the machinist doesn't have to cut the thread at the end of the task. Some machines are very specialised and cannot be used for anything other than 1 function, e.g. overlocker, buttonhole machine (stitches and slits the buttonhole to the correct size), bar tack machine (stitches a really strong, close together 'bar', often used at the top of jeans pockets). See notes above on CNC machines.
Computerised embroidery machines - very fast, there is a needle for each colour of thread. So they have attachments to fit odd shapes, e.g. baseball caps.
Flat bed press - looks like a photocopier, item is placed on the press, the lid is lowered and it presses flat with heat.
Steam dolly - a bit like a metal stick-man, the item is put on the steam dolly, then steam is forced from the dolly so it steams the whole item from the inside out.

Appliqué
 Pattern / decoration is applied to the fabric by cutting out pieces of coloured fabric and stitching them onto the background. The edges of the fabric are usually neaten with a satin stitch (zig-zag with a very small length, 0.2 - 0.5mm, the width can be as wide as is needed for optimum effect, most average about 4mm). Some fabrics such as felt do not need neatening as they do not fray, but a satin stitch may still be used to add to the effect.
 Applique method:

- Pin pattern onto the fabric. • Cut out.
- Pin (& tack if necessary) to background fabric.
- Stitch close to edge with straight stitch (length 2.5mm, width 10mm).
- Finish off with a satin stitch to seal the edges to prevent from fraying.

Transfer Adhesive (trade name Bondaweb) Method

- Iron transfer adhesive (sticky side down) onto coloured fabric.
- Draw pattern onto paper side of transfer adhesive (reverse image).
- Cut out and peel-off the paper.
- Position & iron (set to correct temperature for fabric) onto background fabric. Finish off with a satin stitch to seal the edges to prevent from fraying.

Reverse appliqué method:

- Pin at least 2 different pieces of the same sized fabric together.
- Using a straight stitch, stitch the design onto the layers of fabric.
- Using sharp scissors, cut away the required number of layers of fabric to expose the chosen fabric.
- Finish off with a satin stitch to seal the edges to prevent from fraying.

Social & Environmental issues
 Proper leather and suede involve removing the skin from animals, therefore morally it may be seen as unkind to animals. Even silk involves killing a caterpillar! Synthetic fibres use oils & chemicals, again not very good for the environment. However, pesticides are used on large cotton plantations and these are also bad for the environment. Wool would seem a good idea as no sheep are harmed - however some people (like me) are allergic to it! Dyes are also harmful to the environment, particularly in unscrupulous manufacturers dispose of excess dyes in rivers. Transfer printing is environmentally friendly as it doesn't involve washing away dyes. Fibres such as Synchilla (made from fizzy pop bottles) would be excellent as it means the bottles which would fill landfills are recycled. It is also possible to buy 'Organic Cotton' which doesn't use pesticides.

Some fabrics which would be good to learn

Fabric name	Fibre	Construction	Qualities
Jersey	Any, but usually cotton or polyester	Knitted	Soft, stretchy, doesn't fray
Poplin	Polyester & Cotton	Plain weave	Lightweight (school shirt), easy care, washable, doesn't crease badly
Gingham	Usually cotton, sometimes polyester & cotton.	Plain weave	Lightweight, comes in a variety of check sizes.(school shirt), easy care, washable, doesn't crease badly
Velvet	Cotton	Pile wave	Soft, furry texture, sumptuous, washable
Satin	Acetate or polyester	Satin weave	Shiny, lustrous, looks expensive, frays badly