

# Fiber Glossary

Star Garcia- Textiles 2024



# Fiber Production

Raw Goods



Thread/Yarn



Dyes



Greige Goods



Conversion



Piece Goods



# Vocabulary

**Viscose (or dope):** The liquid state of a man-made fiber before extrusion

**Spinneret:** Shower head like device through which the viscose or dope solution is extruded to form the filament of the fiber

**Extrusion:** Viscose or dope solution is forced through the spinneret by dry, wet, or melt spinning

**Monofilament:** A single strand of untwisted synthetic fiber (i.e. nylon fishing line)

**Continuous monofilament:** Monofilaments or single strand fibers in a continuous form

**Dry spinning:** Filaments are extruded and solidified in warm air. Ex. Acetate, Acrylic, and Mod acrylic

**Wet spinning:** Filaments are extruded and solidified into a liquid bath of chemicals. Ex. Acrylic, and Nylon

**Melt Spinning:** Filaments are extruded and solidified in cool air. Ex. Glass, Polyester, Olefin, and Nylon

**Denier:** The thickness of the extruded filament, determined by the thickness of the holes in the spinneret

**Bicomponent:** Modification of the fiber by combining generic solutions side by side or sheath-in-core

**Bi-constituent:** Modification of the fiber by mixing, homogeneously, different polymers to make a new fiber

**Staple:** Cutting the filaments into short lengths. These are then spun together to make fuller, fluffier yarns

**Texturizing:** Where filaments or staple fibers are kinked, curled, or crimped to resiliency, loft, bulk, and texture to the yarns which are spun from them

**Solution dyeing:** Also known as dope dyeing is the process of adding dye to the viscose or dope solution before it is extruded. This makes the dye color fast or permanent, even and uniform color.

**Trademarks:** Also known as tradenames, are the names given to generic man-made fibers by a particular company or manufacturer. Generic names include: Rayon, Acetate, Triacetate, Glass, Nylon, Metallic, Acrylic, Modacrylic, Polyester, Olefin, Saran, Aramid, Bi-constituent, and Bicomponent.

# Cotton

Discovered from the Tuscan Valley of Mexico- 3500 BC. Fragment of cotton have been sourced from India, Peru, and Southwestern US. Cotton is a flower bud that blossoms to produce an oval shaped boll that splits open that exposes long fluffy seed hairs (attached to the seed). These hair range in length from 1.3- 6 cm or 0.5- 2.5 inches. Shorter fibers grow from the seed and those are called *lint*. Mercerization is the exposure to yarns; this process realigns the strength and absorption in the cotton/ material. Cotton can be blended with rayon, polyester, linen, spandex, and more. Cotton is useful for clothing, towels, plastics, carpets, and paper. Positive characteristics in cotton are: versatility, easily dyed and printed, low luster, absorbent, and comfortable. Negative characteristics are: prone to wrinkles, dries slow, creates mildew (if moist), little resistance to pollution and sunlight, and flammable. Cotton maintenance should be dried, or solvent cleaned- other than linens, such as cotton upholstery.



## Organic Cotton:

Organic cotton is raised using crop rotation with beneficial insects, compost, and other nonchemical farming methods.



# Linen 1/2

Linen is the oldest of all *domestically* produced fabrics. It was discovered that linen helped cure skin diseases like leprosy, increasing the use of linen throughout time. Linen comes from the Flax plant, which is widely produced in the Far East, Europe, Russia, and the British Isles. The flax plant is planted in the months of March/April and harvested around 100 days.

Linen is made by bundling the flax stalks, threshed- separating grain- to remove remaining seed pods, then retted- rotting process- to loosen the outer stalk, then the stalk is passed by a scutching machine to pull out the linen fibers, the fiber is now a silver luster.

Linen has been termed the “fiber of luxury” due to its crisp, long-lived fiber.

Positive characteristics of linen are: crisp appearance, strong fiber, strong when wet, absorbent, low luster, smooth feeling. Negative characteristics are: inflexibility, prone to wrinkles, little resistance to sunlight, stretches in damp climates, flammable, and creates mildew.



Linen is a hydrophilic and hydroscopic- the ability of a substance to absorb moisture/water from its surroundings- fiber. It is suitable for table linens, polishing stemware, dinnerware, and silverware. Linen can be blended with silk, polyester, spandex, viscose, TENCEL™ and cotton



# Linen 2/2

## Union Cloth:

Union Cloth is a cotton-linen blend fabric known for its durability, strength, and twill weave pattern. It is utilized in various applications, including workwear, military uniforms, outdoor apparel, and heavy-duty textile goods (Textile Glossary, 2023).



# Silk 1/2

Silk was discovered in China around 2690 BC, which was found by a Princess who found that the filament of a moth cocoon could be unwrapped.

Silk can come from spiders, caterpillars, and **silk moths**.

**Cultivated silk** comes from the *Bombyx mori* silkworm

**Wild silk** is produced by the *Antherea myllita* and

*Antherea pernyi*

Silk is used for clothing, bedding, parachutes, window treatment, and bike tires. Silk blends well with cotton, linen, wool, and rayon.

Positive characteristics of silk are: elasticity, high luster, lightweight, ages well, accepts dyes well, versatility, and dries quickly. Negative characteristics are: sensitivity to UV light, susceptible to beetle damage, specific care maintenance, may yellow in age, cause mildew, flammable, and wrinkles easily.

Silk is sensitive to sunlight so it must be kept away from direct sunlight. This means draperies must be lined with fabric called pillowcase lining- a separate lining faces the sun, protecting the silk.

You could also screen the windows with UV light window treatment. Silk is also prone to being attacked by insects, so when placed in storage the silk must be cleaned thoroughly and placed in a relaxed, oxygen controlled, and cool environment. Silk should be dry cleaned and handles with care. Silk is hydrophilic and hydroscopic, absorbing up to 33% of its weight without feeling wet. Non-chlorine bleach must be used for silk only when hand laundering specific silk items.



# Silk 2/2

## Raw Silk:

Silk containing sericin is called raw silk. The gummy substance, affording protection during processing, is usually retained until the yarn or fabric stage and is removed by boiling the silk in soap and water, leaving it soft and lustrous, with weight reduced by as much as 30 percent (Brittanica, 2024).

**Degumming** is the process of removing sericin from the raw silk

**Weighting** is the addition of metallic salts to give weight to the silk, causing deterioration to the silk.



# Wool 1/4

High quality wool are the reason historical pieces are treasured. Wool comes from sheep, **but** specialty wool/ hair comes from goats, alpacas, or horses. The *skin* is the pelt of a dead animal- soft and tanned with wool/ hair still attached. Most wool is obtained by shearing the animal is and is called “clipped” and “fleece wool”. If the animal has been slaughtered for its meat, then it is called “pulled wool”. The cleanest and the coarsest wool comes from the back and shoulders of animals. While the softest wool comes from the underbelly of the sheep but has more debris on it. Fine production wool are raised in temperate areas such as the British Isles, Australia, New Zealand, and Spain.

**Short Staple wool** is sheared from the legs of all types of sheep. These are used for carpeting and rugs.

**Medium- short staple** yarns are soft and highly crimped or springy. They are spun on the woolen system- A method of yarn production from wool fibers that have been carded, but not combed or gilled.

**Virgin Wool** has not been spun or woven previously it comes directly from the fleece of a live sheep

**Pulled wool** is removed from a dead animal

**Lambs' wool** is the first sheering from a sheep younger than 7 months old

After sheering the wool, wool must be sorted and graded, scoured to remove grease, dirt, and impurities, carded, spun, and woven.

The maintenance of wool includes being gently hand washed with cold water (because it shrinks when in hot water). If the wool succumbs heat it shrinks the material and causes a yellow discoloring- dry cleaning is the best option. Now If you have a wool carpet the best way to clean it is regularly vacuuming it, removing spills *immediately*, and have it professionally cleaned if need be.

# Wool 2/4

Positive characteristics of wool are: versatility, accepts dye well, resists abrasion, resists soil, water, and grease stains, flame resistant, excellent insulator, wrinkle resistant, blends well with other fibers- such as natural or synthetic fibers, such as cotton, polyester, silk, or nylon-, and available in a wide range of textures. Negative characteristics are: susceptible to moth damage, triggers allergic reactions to some, upholstery may irritate skin, and may shrink.



## Woolen Wool:

Woolen makes use of the shorter ones, which have a softer stitch definition. Woolen yarns contains lots of air, they're light, fluffy, and will often have small ends of fiber poking out of the yarn structure. They're incredibly elastic and bouncy. You can see how much smaller the woolen skein is, bunt when held under tension will stretch out to the same length as the worsted skein. Woolen spun is traditionally spun from carded rolags. It's then spun with the twist entering the drafting zone in a long draw technique (Hilltop Cloud, 2016).



# Wool 3/4

## Worsted Yarn:

Worsted spinning is generally done with the longer fibers, which means that worsted yarns are generally denser. This means that they'll have very clear stitch definition (Garthenor Organic, 2022). Worsted yarns are smooth and dense, they tend to drape well and be much more lustrous. Many commercial yarns are spun in this way, particularly sock yarns. Worsted Spun requires a very different fiber preparation and spinning technique. While woolen spinning is all about trapping air, worsted does the exact opposite (Hilltop Cloud, 2016). Instead of carding the fibers they're combed. Hairs are aligned to be parallel, instead of being rolled up to perpendicular to the direction of the yarn. Twist isn't allowed into the drafting zone, and a short forward draw is used (this is the most common technique most modern spinners use). High end suits are worsted spun wool (Hilltop Cloud, 2016).



# Wool 4/4

Here's a diagram of the yarns in cross section, that shows the difference in how the individual hairs are arranged inside the yarns.

It also illustrates why woolen spun yarns have more yardage for any given weight. So much of their structure is actually trapped air, which makes them very warm (Hilltop Cloud, 2016).



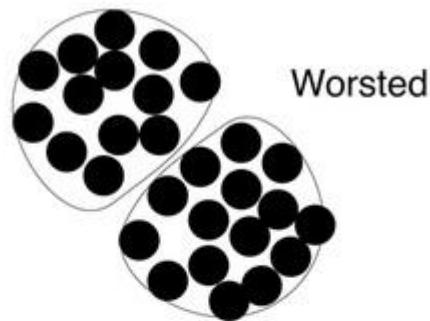
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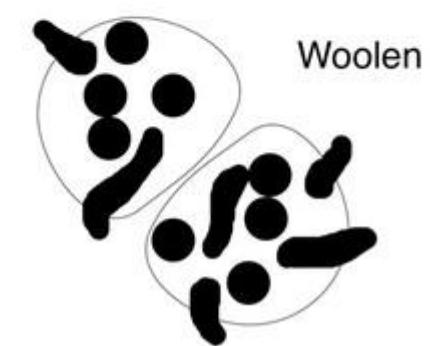
WOOLMARK  
BLEND



WOOL BLEND



Worsted



Woolen



Woolen



Worsted

# Leather 1/4

In prehistoric times animal pelts were preserved with grease and smoke and mainly used for garments, tents, containers, tents, and shoes. By the 1700's leather tanning had become very popular. In the 1800's a machine had been built to split tanned leather into a flesh layer and a grain. In more formal stages of Europe, leather was used for book and upholstery- mainly used for durability instead of fashion. Leather has even been used as floor tiles! Leather has been used for bed headboards and footboards, a pelmet- type window treatment, and as wall coverings.

Skins/ Hides are cured by tanning to prevent decay and impart flexibility and durability. Tanned leather is split into 2 or more thickness to produce a flexible material. The upper side is called **top grain** and the under part is called the **split** (used for suede).

**Tanning** is the process to prepare skins/hides for leather production (show In top right)

If spills get on leather, it can be easily wiped away with a cloth, and can be easily cleaned with mild soap with warm water and a damp cloth (not wet!). Tearing/ ripping of high-quality leather is rare but if it does rip it can be repaired.



Positive characteristics of leather are: a strong and durable material, resists fading, repels liquids and oils, resists fire, resists tearing, won't stretch, maintains shape, easy maintenance, will last a very long time, gets softer after years of use, and leather adjusts to its surroundings ( it is neither cold nor hot)

Negative characteristics are: leather cannot be blended with other fibers, it is limited to uses, the high cost of leather, and the morality of killing an animal.

# Leather 2/4

The process of making leather goes as follow:

**Tanning** is the process to prepare skins/hides for leather productions.

**Finishing** is the application of coloring substances that provide resistance to stains and abrasions, as well as enhancing color.

**Buffing** is mechanical sanding used to even out or smooth the grain.

**Conditioning and lubricating** replaces the natural oils that were taken from the tanning process.

**Vegetable tanning** is used for leathers resilient and springiness and its charm as it ages. The disadvantages of this is it tends to fade In the sun.

## Dyeing

**Finishing** is usually done by hand, and this pulls the leather together.

**Embossing** is placing patterns or designs on the leather

**Enameling or Lacquering** is the chemical application of a high sheen.

**Glazing** is achieved by rolling the leather with a glass cylinder to produce a high gloss, transparent coat.



**Grain enhancement** may be brought out by rubbing or imitated by embossing

**Printing** is the application of color to perceive it is the hide of another animal (zebra or leopard)

**Massaging** is a final finish that ensures the leather remains soft and pliable.

**Grading** is based on suppleness, uniformity or floor and thickness, and the extent of markings. For leather thickness it must be 1.0- 1.2mm and/or a weight of 2 ½ - 2 ¾ ounces per square foot.

# Leather 3/4

## Suede:

Suede leather is made from the underside of the skin, primarily from lamb, although goat, calf, and deer are commonly used. Splits from thick hides of cow and deer are also sueded, but, due to the fiber content, have a shaggy nap (Wikipedia).

Suede must be treated gently due to the absorbency of the material. It is prone to stains, even oil from fingers! To clean stains from suede, you would have to clean immediately after spills/stains. You would need a small amount of powdered detergent with a *damp* cloth then gently remove the stain.



## Embossed Leather:

Embossed leather is leather with artificial patterns stamped on the natural grain of animal skin using a combination of high pressure and heat. Embossed leather features an authentic replica texture of a range of reptiles and exotic animals, such as crocodile, alligator or buffalo (Watch Obsession, 2024).

# Leather 4/4

## Patent Leather:

Patent leather is a high-gloss, grain-free leather, which has been gloss-finished on the surface or covered with a glossy, mirror-smooth film. Patent leather is used for shoes, caps, clothing, wallets and handbags (Leather Dictionary, 2024). Most modern patent leather is made by combining faux leather with a synthetic coating. Meaning it is plastic. However, historically it was created using real calf leather and a natural, oil-based coating, such as linseed oil (Carl Friedrik, 2022).

The origins of patent leather can be traced back to ancient Egypt. More than 4,000 years ago, the Egyptians used a technique called "faience" to glaze ceramic surfaces. This process was later used on leather to create a shiny effect. In ancient Greece and Rome, patent leather was widely used in shoes and clothing to create a luxurious and eye-catching look.



# Other Animal/ Plant Fiber

## Abaca

Abaca (*Musa textilis*) comes from a banana family tree mainly grown in the Philippines. Its fibers are extracted from the leaf and can be as long at 15 feet long. Abaca is a strong, lightweight, and delicate fiber that is used for ropes, table coverings, or place mats for indoor or outdoor use.

Abaca is obtained from the plant leaf stalks (petioles). Although sometimes known as Manila hemp, Cebu hemp, or Davao hemp, the abaca plant is not related to true hemp. The abaca plant grows from rootstock that produces up to about 25 fleshy, fibreless stalks, forming a circular cluster called a mat, or hill. Each stalk is about 5 cm (2 inches) in diameter and produces about 12 to 25 leaves with overlapping leaf stalks (Abaca, 2024).



# Other Animal/ Plant Fiber

## Jute

Jute is from India and Southeast Asia and is used for a burlap cloth. Its uses vary from being webbing, furniture upholstery, storage containers, carpet backing- although jute stretches when in a moist environment so carpets must be changed. Jute is not used as much today due to its weakness and difficulty to spin, its inability to hold dyestuffs without fading and its flammability.

Usually, jute and cotton fiber are blended to make jute-cotton blended yarn (Research Gate, 2007). After jute plants are harvested, the stems are submerged in water for up to a month. This helps with the stripping process later and makes the jute fabric very soft (Parachute Blog).



# Other Animal/ Plant Fiber

## Cashmere

Cashmere is the fine hair of the cashmere/ Kashmir (or down goat). These goats are raised on the high plateaus of Asia and in China, Mongolia, and Tibet. The hair is combed or sheared and then dehaired from the down hair, which leaves the soft, expensive, luxurious, fibers used in throw blankets, scarfs, sweaters, gloves and more. The cashmere goat has large ears, slender limbs, curved spreading horns not spirally twisted, and a long, straight, silky white coat (Brittanica, 2024 ). It is recommended to hand wash or professionally dry clean cashmere sweaters, due to the fine nature of the fiber. Turn your garments inside out and hand wash using warm water (no more than 40 degrees) and a delicate detergent (John Smedley Blog, 2018). Cashmere goats are one of the most expensive animals in the world! (Pashima, 2022)



# Other Animal/ Plant Fiber

## Flokati Goats

Flokati goats are raised in Greece and produce long, fluffy hair. Flokati goat hair is mainly used for rugs (popular in Scandinavian countries). The weavers of the Flokati rugs start by washing the goats, hand spinning the wool, then weaving it into long loops of yarn, and then cut by hand. To make the flokati wool soft and fluffy people must take the flokati goats to a waterfall and the swirling action of the waterfall stream always makes the wool fluffy (Rug Masters, 2023).

To clean a flokati rug you must spot clean the spill as soon as possible with a clean, white cloth dampened with cold water. Blot from the edges and move toward the center. Avoid rubbing or pushing the stain further into the fibers. For a little extra cleaning power, use mild detergent, dishwashing liquid, or foam rug cleaner (Molly Maid).

You also cannot vacuum a flokati rug or the strands will get caught (Apartment Therapy, 2019).



# Other Animal/ Plant Fiber

## Cattle Hide

The process of creating a cattle hide after slaughtered, is to remove the cow hide (top right), tanning, preparing (removing the hair from the hide), coloring and finishing (dyes or embossing), cutting and sewing, manufacturing (Quora, 2023).

**What is curing?** Curing is just cleaning and drying the cow hide. To cure a cow hide you have to scrape the flesh and fat from the skin. You then disinfect the hide with a mixture of bleach and water for 24 hours. Then rinse with salt water. You would then Stretch the cowhide flat with the hairy side down, then rub it with it dry salt, making sure to cover the entire hide. You will need approximately one pound of salt for each pound of cowhide. Let salt remain on the hide for up to two weeks to thoroughly remove any moisture. Hang dry the hide in the sun to complete the curing process (Classroom).



# Rayon 1/3

95% of all rayon is viscose- a type of semi-synthetic fabric. Rayon is one of the most versatile fabrics, due to its versatility to take on the properties of silk, cotton, and wool. In a *nutshell*, rayon is a fabric made from purified cellulose fibers, which are typically created from wood pulp. Though rayon is derived from natural materials, it requires certain chemicals, so it's considered to be a semi-synthetic fabric. One of the most common types of rayon is viscose rayon, which has a lot in common with cotton. It's breathable, moisture-absorbent, and a popular choice for casual and athletic wear.

Washing instructions can vary significantly, its texture and versatility make it an ideal choice for a range of apparel, rayon isn't a durable fabric, and standard machine washing can cause it to stretch, shrink, or bleed onto other articles of clothing. As a result, most experts recommend hand-washing rayon, but always be sure to check the care label instructions beforehand (Who What Wear, 2023).

Rayon is a smooth fabric, sometimes even silky, with a soft texture like cotton or linen. The soft fabric also has a fluid drape, which means it hangs and flows rather than staying rigid and keeping its shape (Master Class, 2021).



# Rayon 2/3

Positive characteristics of rayon are: high absorbency, flexibility, blends well with other fibers, silk like luster, good insect resistance, long lived, and HWM Rayon (High-wet-modulus-a modified version of viscose that is stronger when wet).

Negative characteristics are: weak when wet (unless it is HWM rayon), sensitive to acids, alkalis, and bleaches, low abrasion resistance, susceptible to sunlight deterioration, and create mildew if damp.



## Cellulosic:

Manmade cellulosic (MMCFs) are regenerated fibers usually made from the dissolved wood pulp or “cellulose” of trees. Because they’re plant-based, MMCFs are renewable, and so have the potential to be a climate-friendly material if the wood is sourced sustainably and the processing chemicals are handled properly (Textile Exchange).

Cellulose fibers can be used to create a wide range of fabrics, from a heavy denim or corduroy to a light muslin or organza. Examples of cellulose fibers include hemp, linen, cotton, ramie, and sisal (Heddels).



# Rayon 3/3

## Antique Satin:

Antique satin, also called satin-back shantung, is any five- or eight-harness (shaft) satin weave that uses slubbed or unevenly spun yarns in the weft (filling). It is reversible in that one side is satin and the other is shantung. It is used for simulating 17th and 18th century silks, and clothing such as blouses, lingerie and evening wear. This fabric is heavy and dull and is sensitive to damage from water (which leaves white rings) and light (which shreds it and changes the fabric color). Therefore, antique satin cannot be washed and should be cleaned by a professional fabric expert (Wikipedia, 2023).



# Acetate 1/2

Acetate and triacetate are modified manufactured cellulosic fibers. Triacetate is primarily an apparel fiber. Acetate is an ingredient used in many products like cosmetics, cleaning supplies, and textiles. Companies also use it in food that is canned, processed, pre-packaged, fermented, or condensed. Condiments like mustard also use acetate because of the anti-caking properties of the sodium acetate. Many industries use ethyl acetate as a coating to create products that use acrylics, epoxies, vinyl, urethanes, and cellulosic which is used mainly in the furniture, construction, automobile, mining, and agriculture industries (PostcardsRus, 2018).

Acetate is a general term that defines any plastic film or sheets which comes from a material called cellulose acetate. It is produced from natural sources like cotton or wood chips. Because acetate as a source of polymer, it is often used to create printing materials like plastic film, medical supplies, optic frames, and industrial tools (PostcardsRus, 2018).

Positive characteristics of acetate are: silk like sheen, low absorbency, and dry cleans well. Negative characteristics are: low abrasion resistance, deteriorates in prolonged sunlight, creates mildew if damp, discolors and weakens with age.

**Acetate, a cellulosic fiber, ignites readily and melts in flames.**



# Acetate 2/2

## Cellulosic:

Cellulose acetate is used in fibers, plastics, photographic films, lacquers and reverse osmosis or dialysis membranes. But they do not have the widespread commercial applications of cellulose acetate. Cellulose acetate is an insoluble cellulose derivative regarded as a nontoxic, nonirritant, and biodegradable material. It is heat-resistant and less hygroscopic (Science Direct, 2021). Cellulose acetate offers a soft and luxurious feel, along with excellent draping properties. It also dyes well (LinkedIn, 2023).



## Antique Satin:

Some of the disadvantages of acetate fabric are poor durability, low abrasion resistance, and low wrinkle resistance. All of this makes acetate fabric a poor choice for upholstery or furniture that is expected to see a lot of wear and tear around your home. Acetate fabric is like silk, so due to its silk like qualities, this fabric is often used for clothing, mainly evening attire such as formal shirts, as well as evening gowns or wedding dresses. It can also be used for drapes or curtains, linings on garments, and furniture upholstery or pillows (Calgary Interiors, 2020).



# (Mod)Acrylic

Modacrylic is a manufactured fiber in which the fiber forming substance is any long chain synthetic polymer composed of less than 85% but at least 35% by weight of acrylonitrile units. Modacrylic fibers are made from resins that are copolymers (combinations) of acrylonitrile and other materials, such as vinyl chloride, vinylidene chloride or vinyl bromide. Modacrylic fibers are either dry spun or wet spun.

Positive characteristics are: soft fabric, resilient, easy to dye bright shades, abrasion resistant, flame resistant, quick drawing, shape retentive, nonabsorbent, wrinkle resistant, and resist bleach, sunlight, moths, mildew, and stains.

Negative characteristics are: static, easily melts, and bulky/dense.

Here are some applications of acrylic: Trims and linings, simulated fur, wigs, children's sleepwear, career apparel, fake wools, blankets, carpets, flame-resistant draperies and curtains, filters, industrial fabrics, paint rollers, and stuffed toys.



# Nylon

Nylon, or Polyamide, is a manufactured fiber which is a long chain polymer from petroleum, natural gas, air and water. It is dry spun then stretched. Nylons are white or colorless and soft; some are silk-like. They are thermoplastic, which means that they can be melt-processed into fibers, films, and diverse shapes (Wikipedia).



The first use of nylon was toothbrush bristles but intentionally for silk stockings. It is now used for fishing line, gears, fishnets, machine parts, medical implants, toothbrushes and wheels. Nylon clothing has a slick smoothness to it which makes it comfortable to wear. It is lightweight yet strong and is breathable.

Positive characteristics of nylon are: strong material, durable, dyes good, versatile, resist moths and mildew, elastic, abrasion resistant, easy to wash, resistant to damage from oil and many chemicals, and low moisture absorbency.

Negative characteristics are: coarse material, sheen is high, sheds, fuzzies, fades in sunlight, wrinkles permanently, and static



# Olefin 1/2

Italy began producing olefin fibers in 1957. The United States began producing olefin in 1960. Depending upon its chemical structure, olefin may be called polyethylene or polypropylene. It is also referred to as P2 for short. Olefin is produced in much the same way as polyester and nylon. The chemicals used to make olefin are melted and fed through a spinneret head (like a large showerhead) where it then forms a long fiber. The fiber then solidifies by some cooling process. Variations and additives used during the manufacturing process of fibers can alter the characteristics and end uses of the fibers tremendously.

Olefin does not transmit static charges, and it is remarkably soft and smooth. Water-resistant – Moisture is wicked away and dries off quickly when it meets this material. Durable – This material is highly durable and stands up particularly well to abrasion (Bean Bags R Us, 2020). Olefin is used for sports wears, socks, thermal wear, swimwear, draperies, wall coverings, carpets, tiles, arm rests, car trunks, and ropes.

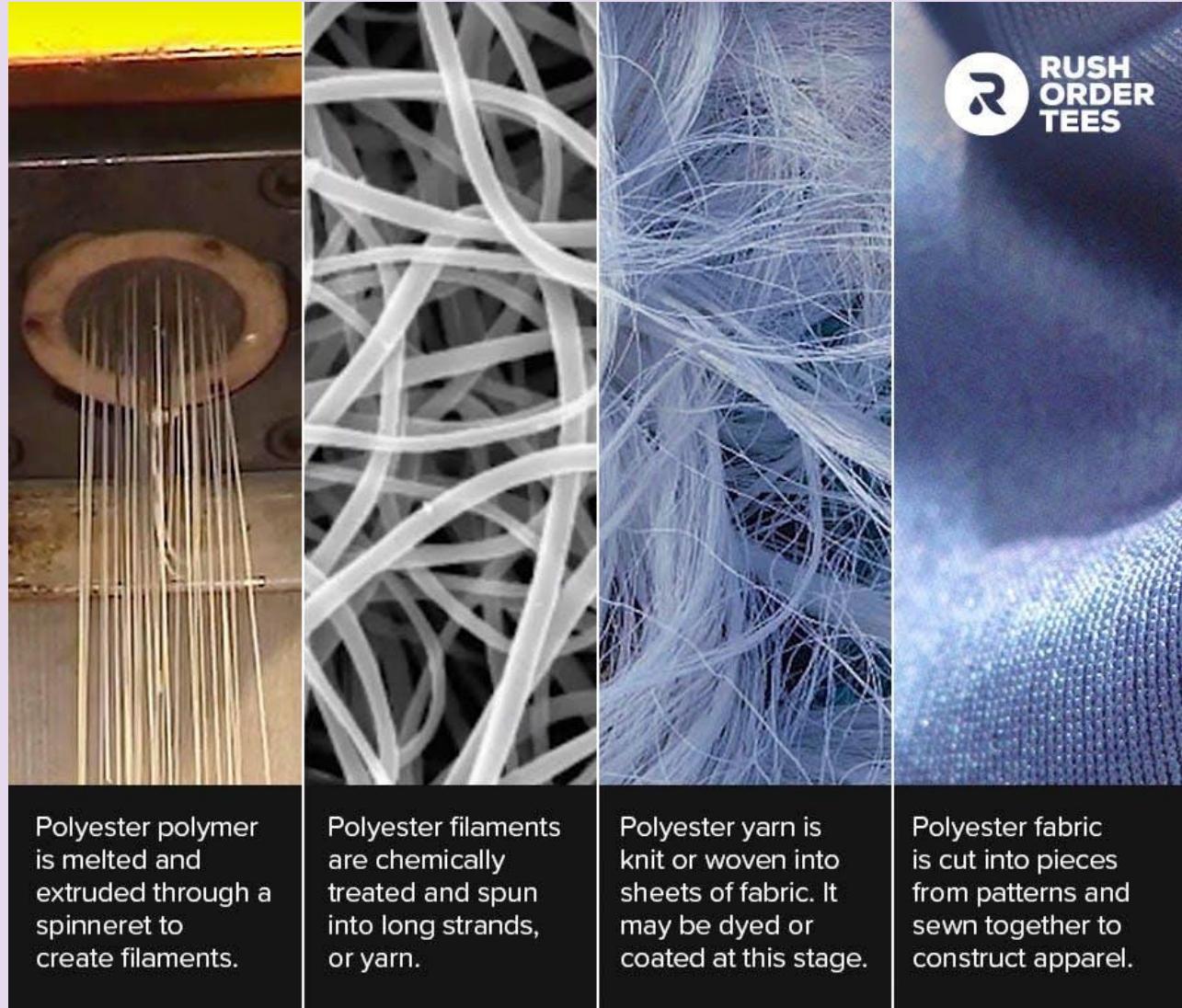
Positive characteristics of olefin are: dries quickly, good abrasion resistance, resistant to degradation, stain resistant, good strength, lightweight, low cost, environmentally friendly, low moisture absorbency, and good shape retention.



# Polyester 1/2

Polyester is a synthetic or man-made fiber material. Shortened from its technical name, polyethylene terephthalate (PET) (Apex Mills, 2022).

Polyester clothing is made from plastic bottles, they shred the bottles first, wrapped in blocks, to shipped-clear plastics are made into white clothes-They then wash the plastics in chemicals to remove any labels or colors that might be on the plastics. They then spend 10 hours tumble drying. They then melt the plastics at 270 degrees to turn it into thread. It is then stretched and combined many times all while being heated to strengthen the thread to turn it into cloth. Then the thread is torn apart to make the fibers fluffy. It is then carded to strengthen the material. Then spun to turn into thread. It is then turned into cloth material and then tufted to make the cloth soft to the touch. It is then ready to be turned into clothing to sell (YouTube, 2010).



# Polyester 1/2

Positive characteristics of polyester are: stable, strong permanent body, resist light deterioration, wrinkle resistant, abrasion resistance, shrinking and stretching resistant, resist most chemicals, textured softness, resist flames, mildew, and moths, dries quickly, and resilient when wet or dry.

Negative characteristics are: oil stains clean onto material and static.

Polyester can be used for a lot of things such as clothing, sportswear, formal wear, drapes, lace, upholstery, carpeting, bedding, wall coverings, and more. To wash polyester all you must do is wash it and dry it no other special instructions. Polyester feels silk and smooth with a bit of slippery texture; it is not as breathable as other fabrics like cotton, but it is lightweight in drapes nicely (Awkward Styles, 2023).



# Vinyl 1/4

Vinyl is a synthetic fiber made from polyvinyl chloride. Outside the United States, vinyl fibers are referred to as polyvinyl chloride fibers. It can bind non-woven fibers and fabrics. doesn't flame, but softens at low temperatures (55 C), has a high resistance to chemicals, Moisture absorption is less than 0.5% and moisture regained is less than 0.1%. Also used in industrial applications as a bonding agent for non-woven fabrics and products. Vinyl is a Liquid solution made up of vinyl alcohol hydrochloric or polyvinyl chloride. Extruded as film often on to a knit or non woven backing. It can be used for window shades, rubber ducks, plastic coverings for furniture, upholstery, shower curtains, jackets, raincoats, boots, rain boots, wire cables, packaging, vinyl's, automotive appliances, and medical equipment.

Positive characteristics of vinyl are: durability, abrasion resistant, resist soil and stains, imitation leather, and easily cleaned.

Negative characteristics are: can be uncomfortable, not breathable, cracks and splits, damaged by punctures, repair is difficult, becomes brittle and inflexible with age, nonabsorbent, and melts then burns slowly.



# Vinyl 2/4

## Non-woven:

Non-woven vinyl combines practicality with aesthetics, making it a versatile choice across various industries and creative endeavors!

Non woven vinyl can be used for wall coverings and wallpaper, home furnishings (such as upholstery, cushions and pillows, and tablecloths), automotive interiors (such as car seats and door panels), bags (such as tote bags, backpacks, and wallets), medical and hygiene products (such as surgical gowns, drapes, diapers and sanitary pads, and disposable bed linens), industrial applications (such as vacuum bags, HEPA filters, and thermal insulation), outdoor use (such as boat covers, truck tarps, and pool covers), fashion (such as raincoats, hats, shoes, belts, and wallets), crafts and DIY, interior design and renovation (such as wall coverings) (Livette's Wallpaper).



# Vinyl 3/4

## Woven:

Woven vinyl is a contemporary and eco-friendly alternative with the benefits of a soft surface flooring and the performance of a hard-surface product. Well known in the boating community as vessel flooring, woven vinyl flooring is making waves on the commercial scene and offers a unique combination of durability and beauty. Woven fabric layers bring depth and texture together for a stunning look. Made from PVC coated polyester yarn, woven vinyl flooring is easily sanitized, slip-resistant and may be applied in a myriad of settings, including: Education: Classrooms, libraries, hallways, common areas. Healthcare and Assisted Living Facilities: Hallways, patient rooms, eating areas, waiting rooms, doctors' offices (Continental Flooring Company, 2021).



# Vinyl 4/4

## Knit Jersey:

Jersey is a soft stretchy, knit fabric that was originally made from wool. Today, jersey is also made from cotton, cotton blends, and synthetic fibers. The right side of jersey knit fabric is smooth with a slight single rib knit, while the backside of jersey is piled with loops. The fabric is usually light-to-medium weight and is used for a variety of clothing and household items. Jersey is a knit fabric, not a woven fabric. As a result, jersey has more stretch and give. There are two main types of jersey fabric, depending on the knit style:

1. Standard jersey. Also called single knit or plain knit, this is made using one set of needles and appears smooth on one side and piled on the other.
2. Double-knit jersey. Also called interlock jersey, this is two pieces of single knit jersey knit together to create a smooth surface on both sides (Master Class, 2021).

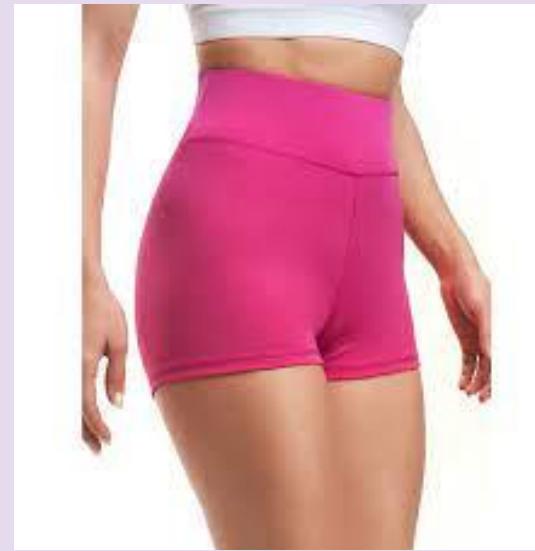
Having said that, jersey-knit fabrics aren't always made of 100% cotton. Synthetic blends are typically not as breathable or moisture-wicking, so they're not ideal for people who run hot at night or sweat a lot (Parachute Home).



# Other Manmade Fibers

## Spandex

Spandex Fiber (Elastane), is a manufactured fiber in which the fiber forming substance is a long-chain synthetic polymer comprised of at least 85% of a segmented polyurethane. Can be stretched repeatedly and still recover to very near its original length and shape, Generally, can be stretched more than 500% without breaking, Stronger, more durable and higher retractive force than rubber, Lightweight, soft, smooth, supple. In garments, provides a combination of comfort and fit, prevents bagging and sagging. Heat-settable — facilitates transforming puckered fabrics into flat fabrics, or flat fabrics into permanent rounded shapes, Dyeable , Resistant to deterioration by body oils, perspiration, lotions or detergents, Abrasion resistant, When fabrics containing spandex are sewn, the needle causes little or no damage from “needle cutting” compared to the older types of elastic materials.



# Other Manmade Fibers

## Kevlar

Kevlar® is a heat-resistant para-aramid synthetic fiber with a molecular structure of many inter-chain bonds that make Kevlar® incredibly strong. Best known for its use in ballistic body armor, Kevlar® also has many other applications because of its high tensile strength-to-weight ratio. The chemical structure of Kevlar® is comprised of several repeating inter-chain bonds. These chains are cross-linked with hydrogen bonds, providing a tensile strength 10X greater than steel on an equal weight basis. Kevlar® is inherently flame resistant—protecting against thermal hazards up to 800 degrees Fahrenheit. Additionally, Kevlar® fibers won't melt, drip or support combustion.



# Other Manmade Fibers

## Plaster

Plaster is a soft mixture of lime with sand or cement and water for spreading on walls, ceilings, or other structures to form a smooth hard surface when dried.

Plaster is a protective coating that is applied to masonry to protect it from external agents and damage. It consists of a mixture between a mortar and a binder (hardener) that allows the plaster to adhere to the wall (Ermetika, 2022). For casts, the hard, outer layer of a cast is made of either plaster or fiberglass. Cotton and other synthetic materials are used to line the inside of the cast to make it soft and provide padding around bony areas, such as the ankle, wrist, or elbow (Boston Childrens Hospital).



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