The term "textile" encompasses a larger scope than ordinary knitted or woven fabrics.

- A wide range of materials have found their way into applications for which more flexible fabrics are also used. Thus, plastic or olefin nonwoven sheeting has found use in garments, accessories, interior furnishings and household items, in addition to industrial applications.

- Some non-textile materials are simulated in textile fabrications. For example, animal furs are replicated in knit or woven pile fabrics, and leather is simulated in vinyl coated or laminated fabrics.

The section on "Other Materials" includes leather, furs, and their textile counterparts.
Leather - a natural product that is obtained from the skin of a variety of different animals, reptiles, and a few large birds such as the ostrich.

- The majority of leather is made from cowhide.
  - Calfskin - soft leather obtained from a calf.
  - Kipskin - leather from an older calf or a smaller animal.
- Sheep, goat, buffalo, deer and pig hide are some of the other sources for leather used for apparel, accessories, and interiors.

- Source is often stated for leathers obtained from reptiles and large birds.
  - Examples - snake, alligator, sting ray, and ostrich.

- Leather shape, size, and quality are determined by the source and processing.
  - Note: ASTM D1517 provides a detailed terminology document, with explanations of types of leather and treatments of leather.
Leather type, size, and cost are important in selection of leather for specific end uses.

- For some end use applications, thinner, softer leathers are preferred (e.g., driving gloves); for other uses, thicker leathers may be more suitable (e.g., briefcase).

**Full Grain** leather - the highest quality leather.

- Includes the outer layer known as the grain.
- High quality leather with natural markings made with hide with minimal scars or imperfections.
- Is very durable as the outer layer is still intact.
Leather Quality

- **Top Grain** leather does not include the topmost part of the outer layer of the animal hide.
  - Outer surface of the leather is sanded and buffed or smoothed to remove scars.
  - Durable.
  - Often used for high quality furniture, bags, and other leather items.

- **Split** leather is the flesh side (under section of the hide) and has no grain.
  - Available in several thicknesses, with thinner split leather made by further splitting the under section.
  - Not as durable as leather with outer layer.
  - Used for suede and leather with embossed designs.
Leather Processing

- All types of leathers undergo several processing steps starting with preparation prior to tanning.

- **Tanning** - helps preserve the leather and prevents it from cracking over a period of time.
  - Method of tanning, chemicals used for tanning, and duration for which the leather is tanned are factors that can affect the final quality of leather.
  - Leather is often treated with fats and oils to make it pliable.
  - Several methods are used for dyeing leather; in good quality leather the dye penetrates through the entire depth of the skin.
Leather Finishes

- **Embossed** – application of heat and pressure; leather is placed under a heated metal plate and pressure applied to create the pattern.
  - Terms such as corrected grain or enhanced grain is used for leathers in which the natural grain has been replaced by embossing a grain pattern that resembles natural grain.
  - Used to emboss cowhide to look like alligator or snakeskin.
  - Used to imprint designs and text (e.g., brand name) on the leather.

- **Buffed or Sanded** – Sanded to give the surface a softer touch or to remove scars and other imperfections.
  - Suede - example of buffed or sanded leather.
  - Sanding the grain side produces a soft surface which resembles suede, but is more durable than suede.
Leather Finishes

- **Enameled or Lacquered** – Lacquered or enameled to produce patent leather, a type of leather with a permanent shine; embossed design can also be used to make patent leather.

- **Pearlized** – Fine reflective powder, typically silver or gold in color, is added during finishing to give subtle shine.

- **Other Finishes** – Protect leather during use, e.g. pigment coated to protect the surface. Water and stain repellent finish is added to the dye bath to make the leather repellent.
Types of Leather

- **Suede** - made by sanding the flesh side of the leather to produce a nap. Also produced by sanding split leather. Not as strong as the one made by sanding or buffing the flesh side of the hide.

- **Chamois** - thin suede leather made from sheep or deer skin.

- **Nubuck** - leather with the grain side sanded or buffed to produce a soft, sueded surface.
  - Resembles suede, but not considered suede since it is the grain side that is sanded, whereas in suede it is the flesh side that is sanded.

- **Nappa** - full grain leather, known for its quality. Typically made with unsplit leather from sheep, lamb or goat skin.

- **Hair-on** leather includes the animal hairs in the epidermis.
Types of Leather

- **Kid or kidskin** - generic term for leather used in gloves or shoes made from goat skins.

- **Exotic hides** from other animals (zebra) and skins from reptiles (snake, alligator, crocodile), birds (ostrich, ostrich legs), and fish (sting ray, eel, shark) are generally much more expensive and limited in quantity. They are typically labeled to include the animal name; the term "leather" is usually interpreted as hide from cattle.

- **Exotic leather imprints** are embossed on cattle hide to produce leather "look alikes" at a lower cost. Described with terms such as "snake-like leather" and "leather with alligator imprint."
  - Note: Less expensive than those made with reptile skin, but more expensive than faux leather with a reptile print.
Types of Leather

- **Reconstituted, bonded, pulverized, ground, or shredded leather** - technically not considered leather as it is made with leather and non-leather materials.
  - According to the Federal Trade Commission, "If the terms 'ground leather,' 'pulverized leather,' 'shredded leather,' 'reconstituted leather,' or 'bonded leather' are used, a disclosure of the percentage of leather fibers and the percentage of non-leather substances contained in the material must be reported" (Source: FTC 16 C.F.R., Section 24 Guides for Select Leather and Imitation Leather).
  - Vary considerably in cost, quality and appearance.
  - Majority are formed by the use of resins or adhesives that bond together the leather fibers.
  - Newer technology used for manufacture of materials such as E-Leather® in which water is used to entangle leather fibers on a fabric base.
Leather Ethics and Environmental Issues

- **Ethical** and **environmental** issues related to leather depend on the source of the hide/skin, the manufacturing process, and chemicals used for manufacturing.
  - Leather by-products of the meat industry are considered environmentally friendly.
  - Leather obtained from wild animals is controversial. Issues are raised by some concerning animal cruelty while others say controlled trapping does not have a negative impact; it helps keep the animal population in control.
  - Compliance with import/export regulation is important for exotic skins from animals whose populations are threatened by extinction.
    - **CITES** (the Convention on International Trade in Endangered Species of Wild Fauna and Flora) - an international agreement, among nearly 200 different countries, pledging to collaborate in safeguarding species of animals and plants so that they do not become extinct.
  - Leather labels do not provide source of the hide; this information would be beneficial for individuals who do not use leather from certain animals due to religious beliefs.
Faux Leather

- **Faux or imitation** leather - materials that resemble leather but do not have an animal source.
- Many are multicomponent materials with a woven, knitted, or nonwoven base fabric; thus technically, they are textile materials.
- Appearance, quality, and cost vary considerably.
  - Fabrics coated with polyurethane or PVC (polyvinyl chloride) are embossed to produce the grain and appearance of leather.
  - Some composites, labeled poromeric, have a more porous structure that makes the fabric "breathable."
- Cracking and poor edge abrasion resistance are the most common problems with coated materials.
- Special care required for vinyl coated materials as some chemicals have an adverse effect on these materials.
Common Reasons for Selecting Faux Leather

- **Lower Cost** – used to produce less expensive end products. For example:
  - To reduce cost, the sides of a leather sofa may be made with faux leather with embossed grain that resembles the sofa front. The faux leather may start wearing along the edges as a result of use.
  - Often used in lower cost handbags or wallets.

![Vinyl Faux Leather Belt with Snakeskin Pattern](image)
Common Reasons for Selecting Faux Leather

- **Performance** – Performance of some of the faux/imitation leather and reconstituted leather is good. New technologies are used to produce materials that feel like leather as opposed to the plastic-like feel of the lower quality materials.

  For certain applications, higher performance faux leather materials may be preferred for one or more of the following reasons:
  - Consistency in color and texture
  - Availability in large quantities
  - Ability to be laid out and cut from a bolt
  - Availability in a wide variety of colors and textures
  - Lightweight
  - Cleanability
  - Availability with antimicrobial treatment

- **Religious and Personal Beliefs** – In some cases, faux/imitation leather may be preferable to leather due to personal/religious beliefs.
Fur

- Fur has been used to provide warmth in cold weather since prehistoric times.
- **Fur** is defined as "any animal skin or part thereof with hair, fleece, or fur fibers attached thereto, either in its raw or processed state, but shall not include such skins as are to be converted into leather or which in processing shall have the hair, fleece, or fur fiber completely removed" (Source: *Fur Products Labeling Act*).
- Quality of fur varies by season; because fur provides the warmth needed in the winter months, the fur quality on an animal is the best when the weather is cold. Furs often have two types of hair:
  - **Underfur/undercoat** - the shorter finer layer of hair next to the skin that provides warmth.
  - **Guard hair** - the coarser, longer, often more lustrous outer hair that covers the underfur/undercoat.
Fur is obtained from animals in the wild as well as from those reared at fur farms/ranches.

In Canada and the United States, mink and fox fur are often obtained from animals raised on ranches.

Examples of wild fur are beaver, raccoon, sable, muskrat, wild mink, lynx, bobcat and coyote.

Import and sale of cat and dog fur (domestic animals) as well as furs from endangered species such as seals are banned in the United States and Canada.
Types of Fur

- **Mink fur** - shiny with soft guard hair and dense underfur. Length of underfur hair is fairly uniform. Sheared mink has softer hand compared to unsheared mink.
  - Wild mink is brown; farm-raised is black, white or mixed.
  - Mink pelts are long and narrow.
  - One of the more expensive furs.

- **Fox fur** - obtained from wild and ranch/farm raised animals. Has long, soft guard hair with a thick underfur that provides warmth.
  - In the wild, fox fur is obtained from three species - red, gray, and arctic. Other fox names are given to ranch-raised fox.
  - Fox pelts are larger than mink pelts as they are from a larger animal.
Types of Fur

- **Beaver fur** - long shiny guard hair and dense underfur. Sheared beaver fur has a softer hand than unsheared beaver; stiffer guard hairs are cut and the softer underfur is visible.

- **Sable** (or marten) fur - very soft, dense, and relatively short. Pelts are the same size as mink pelts. One of the more expensive furs.

- **Lynx** fur - very soft hand; pile is shorter than fox fur but longer than beaver.

- **Coyote** fur - thick and durable; it is often used for men's clothing. One of the least expensive furs.
Fur Processing

- Typically cleaned, stretched, and dried before it is processed or converted to useable form; at this stage it is known as raw pelt.

- Raw pelt consignments are often auctioned based on type, quality, size, shape and color.
  - Raw pelts used for apparel and interiors are typically tanned using natural or synthetic chemicals to convert the skin part of the fur to leather.

- Skin is often thinned, cleaned, and lubricated before the fur side is brushed and pressed.

- Most furs are used with the leather side on the inside of the garment or final product.
  - In **shearling**, the leather side of lamb pelt is sueded and used on the outside.
Given below are some of the processes used to give fur the desired appearance:

- **Shearing** - sheared for a more uniform pile.
  - Note: The process is similar to that used to give pile weave fabrics a uniform pile.

- **Dyeing** - applied to either create a new color or correct imperfections. In some cases, the pelt is bleached and then dyed.
  - Note: According to the Fur Labeling Act, the label is required to state that the fur has been bleached and/or dyed.

- **Tip Dyeing** - guard hair tips are dyed to give a more uniform appearance. This process is also known as blending.
Fur Regulations and Ethics


- Fur trade - affected by issues related to animal cruelty and safeguard of species.
  - **CITES** (the Convention on International Trade in Endangered Species of Wild Fauna and Flora)- international agreement among nearly 200 different countries that pledges to collaborate in safeguarding species of animals and plants so that they do not become extinct.
  - **Origin Assured™** - program developed to certify that fur is from a country with local or national animal welfare regulations/standards for fur production. OA™ label can be used only for furs that are obtained from approved species, are from countries that meet the regulation requirements, and were sold through approved auction houses. A means for building transparency and informing consumers about the source of fur.
Faux Fur

- **Faux** fur and **imitation** fur - terms used for pile fabrics that look like fur.
- Appearance, quality, and cost vary considerably.
- Available in different pile heights and densities, including those made with different types of fibers to imitate underfur and guard hair.
- Fiber properties, fabric construction, dyeing and finishing enable manufacture of faux furs that resemble a variety of natural furs.
- Low quality, faux furs have many uses; high quality, faux furs are so well-made that it is hard to discern the difference from real furs from visual appearance only.
- Majority of the faux furs are manufactured with acrylic, modacrylic and polyester fibers used for the pile.
  - Fiber content and modifications such as shape and thickness are important in the selection of fibers to achieve the desired look.
  - In some faux furs, acrylic fibers are used for finer, shorter, crimped fiber to imitate underfur and thicker, longer polyester fibers are used to imitate guard hair.
**Faux furs** - knitted, woven and tufted pile fabrics.

- Fabrics with a knitted base stretch; fabrics with woven base are more stable.
- Majority are weft pile knits.
  - Pile knits are produced by inserting slivers as the extra pile yarn. Shedding of the pile - a problem with most faux furs with a knitted base.
- Some high end faux furs are woven pile fabrics constructed with a "W" pile interlacing that is more securely attached to the base fabric and therefore does not shed.
- Tufted faux furs are used for throws and rugs.
Faux Fur

- Dyeing and printing techniques vary considerably based on the type and quality of faux fur.
  - Some are made with solution dyed fibers; some color is added to others at various stages of manufacturing.
  - Tip dyeing used to dye the longer fibers that resemble guard hair.
  - Some dyed pile fibers are also printed to create an interesting look.

- Finishing of faux fur is similar to that of fur. Shearing is used to create a uniform pile in some faux furs. A special finish known as electrifying is used to give the pile a smooth, lustrous appearance.
Common Reasons for Selecting Faux Fur

- **Lower Cost** – majority of faux furs cost less than real fur; used in winter clothes and accessories. Note: Not all furs are expensive; some trims made with inexpensive furs have been mislabeled and used as faux fur. Mislabeling can be determined by:
  - Checking the fabric back, if visible.
  - Checking the tips of guard hair fibers (cannot be used for sheared fur). The guard hair in fur has a tapered tip, whereas the fiber tips are cut in faux fur.
  - Conducting a burning test. Burning just a few fibers from an inconspicuous area can also assist in differentiating between fur and faux fur. Fur fibers will form a crushable bead and smell of burning hair. Important: Safety precautions are required for burning test.
Common Reasons for Selecting Faux Fur

- **Performance** - used for trims and garments as it is easy to care for. Important for garments in which the faux fur is used as a trim. For example, a knitted sweater with faux fur trim would not require special cleaning due to the fur trim.

- **Religious and Personal Beliefs**
  - Some individuals do not use fur as it from animal sources where the animal is killed to obtain the material.
  - Animal cruelty is a controversial issue, with pros and cons presented by various groups.