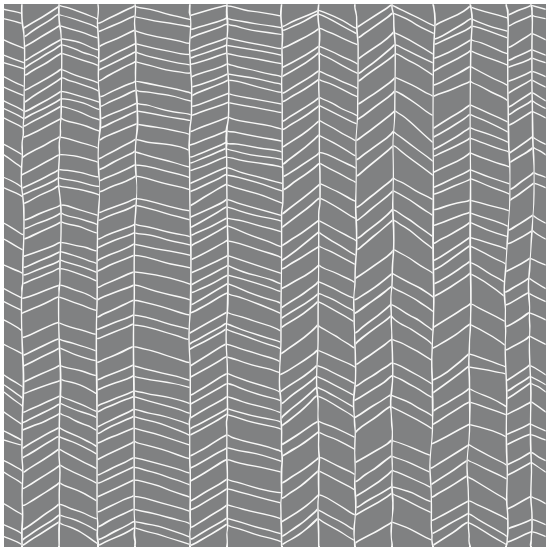
Weaves

THOUSANDS of years ago, people used natural grasses, leafstalks, palm leaves, and thin strips of wood to weave. Today weaving is done on high-speed looms and is a major industry in many countries. Weaving can be plain and simple or decorative and artistic. Weave patterns, such as this hand-drawn chevron pattern, are able to create depth, interest, and volume; they fool the eye.



Objectives:

1. Define industry terminology used in weave construction.
2. Describe common weaves.

Key Terms:

basket weave
bias grain
crosswise grain
dobby weave
fabric
fabric weight
fill
floats
grain
high count
jacquard weave
lengthwise grain
loom
low count
off-grain fabrics
pile weave
plain weave
satin weave
selvage
skew
thread count
true grain
twill weave
warp
weaving
weft
woof

Textile Industry Terminology

Fabric is cloth, which is a textile produced as the end product of weaving. It is made from natural or synthetic fibers. The fibers are twisted together to form yarn. In turn, yarn is woven or knitted together to form fabric. **Weaving** is a process of interlacing lengthwise yarns with crosswise yarns, usually at right angles. It is also the act of producing cloth.

BASIC INDUSTRY WEAVING TERMS

A **loom** is a hand-operated or automated machine used to make fabric by weaving yarn or thread.

The **warp** is the strongest yarn of all the threads or yarns that run lengthwise in a woven fabric. It is kept taut (tight and stretched) throughout the weaving process.

Woof, **weft**, and **fill** are used interchangeably to denote the yarns or threads that run crosswise in a woven fabric. They go over and under the warp yarns during weaving. They are not as strong as the warp yarns because woof yarns are not stretched.

The **grain** is something that impacts how the fabric will drape or hang. Three types of fabric grain are lengthwise, crosswise, and bias.

- **Lengthwise grain** is straight grain that runs lengthwise on the loom and lengthwise in the fabric. It is created by the warp yarns. Lengthwise grain runs parallel to the selvage. Another name for lengthwise grain is **true grain**. The warp yarns are at a perfect 90-degree angle to the crosswise woof yarns.
- **Crosswise grain** is grain that runs perpendicular to the selvage, or the cut edge of fabric. It runs over and under the warp yarns and is created by the woof yarns.
- **Bias grain** is the thread line that runs at a 45-degree angle, or as a diagonal line, through a woven fabric's lengthwise and crosswise grains. Bias grains stretch more than crosswise or lengthwise grains. Garments cut on the bias hang differently, having more "swing" than those cut on the straight or crosswise grain.

FIGURE 1. Did this tailor layout the suit pattern on the lengthwise, crosswise, or bias grain of the fabric? How can you tell?

The **selvage** is the long and often bound edge of fabric that does not fray or ravel because the woof (crosswise) threads or yarns turn around and go back across the fabric rather than being cut. The selvage prevents fabric from raveling on the lengthwise grain.

Off-grain fabrics are fabrics with less than perfect 90-degree warp yarns. Off-grain fabrics are those that twist and cause the garment drape to be crooked. Woven fabrics tend to stretch during handling, and that stretching can **skew** (disrupt) the grain of the warp and/or woof yarns.

Common Weaving Patterns

Fabric weave determines the fabric pattern. Yarns are woven to produce effects from simple to artistic and decorative.

PLAIN WEAVE

Plain weave is one woof yarn woven over and under one warp yarn. A lightweight plain-weave fabric is simple, durable, and flat, with a tight surface on which prints and other finishes can be applied. Lightweight plain-weave fabrics are gauze, crinoline, cheesecloth, chiffon, organdy, and organza. Medium-weight plain-weave fabrics are chambray, gingham, muslin, percale, chintz, and calico. In contrast, heavyweight plain-weave fabrics include homespun osnaburg (oz-nuh-burg)—a coarse plain-weave cotton fabric used for grain sacks, sportswear, and butcher linen.

FIGURE 2. This plain-weave organza fabric illustrates how one woof yarn is woven over and under one warp yarn. Plain organza fabrics are used for decorative bows and gift bags, as well as garments and window covers.

BASKET WEAVE

Basket weave is a variation on the plain weave, except that two or more woof yarns sitting side by side and treated as one yarn are passed over and under one or more warp yarns. Basket weave has a looser construction than plain weave and is more flexible and stronger. However, it is less stable. Uses for basket weave include outerwear, monk's cloth, hopsacking, oxford cloth, duck, canvas, and drapery.

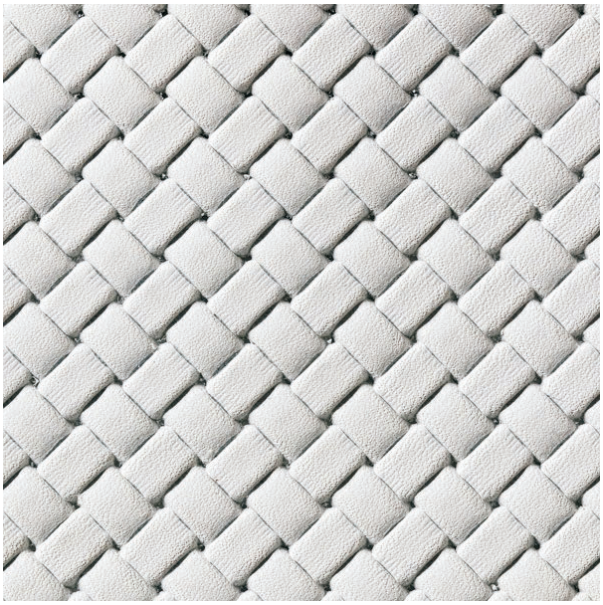


FIGURE 3. Basket weave is a variation of the plain weave but with a looser construction. What are some uses for this white leather basket-weave fabric?

SATIN WEAVE

Satin weave is a yarn from one direction floating four or more weft yarns from the other direction and then passing under one yarn. If yarn **floats**, it passes over other yarn. It passes over a single warp yarn to produce sateen fabric. In reverse, four warp yarns float over a

single weft yarn to produce satin. Antique satin combines acetate warp threads with rayon weft threads to produce decorative fabric used primarily in draperies. Peau de soie (poh-duh-swah) is a medium-weight satin with a lustrous finish and stiff drape. It is used in bridal gowns and other elegant dresses.

TWILL WEAVE

Twill weave is a warp or woof yarn floating across two or more warp or woof yarns, forming a diagonal line. This creates a pattern of diagonal parallel ribs. Examples of twill weave are serge, surah, denim, gabardine, flannel, tartan-patterned plaids, and herringbone.

- Serge, made of worsted wool, is used for clothing.
- Surah is lightweight lustrous twill made of silk or synthetic fiber. It is used for ties, dresses, and furnishings.
- Denim is rugged cotton twill. It is characterized by dying the warp threads indigo and leaving the weft threads white. For this reason, jeans are white on the inside.
- Gabardine is tough, tightly woven twill made of worsted wool (wool fibers combed in one direction), cotton, polyester, or a blend. It is used to make overcoats, suits, trousers, uniforms, windbreakers, and other garments.
- Flannel is soft fabric originally made of worsted yarn, wool, cotton, or synthetic fiber. It is brushed to change the fine fibers of loosely spun yarn into soft nap. Generally, flannel is used in tartan clothing, sleepwear, blankets, and bedsheets.
- Tartan-patterned plaids are made by alternating bands of colored threads woven in a twill weave, with warp and weft at right angles to each other. Original tartan plaids were wool, but other fabrics are also used now.
- Herringbone is a V-shaped pattern often found in twill cloth. The pattern resembles the skeleton of a herring fish. Typically, herringbone tweed is used to make suits and outerwear.

FIGURE 4. Peau de soie is a smooth, soft, satin-weave fabric of ribbed silk or rayon with a slightly dull finish. Wedding dresses and satin or silk shoes, such as these ballet toe shoes, are common uses for peau de soie satin.

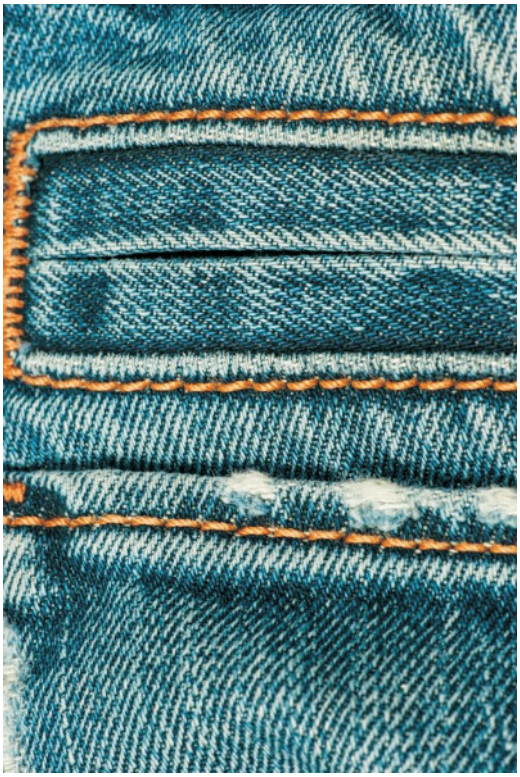


FIGURE 5. Denim is an excellent example of twill fabric. It is easy to see the yarn floating across the surface to form a diagonal line. Can you spot the indigo-colored warp threads and the white weft threads?

DOBBY WEAVE

FIGURE 6. This is a sample of white-on-white fabric on a dobby weaving loom.

Dobby weave is a small, intricate geometric or floral pattern woven in with a special loom attachment. Brocade, damask, and brocatelle fabrics are dobby woven. Another fabric example is bird's eye; it features small-scale geometric shapes with a dot in the middle, representing the eye of a bird. Certain patterned upholstery and drapery that appear elegant and soft are made of heavy dobby fabrics. White-on-white fabrics can also be elegant and soft, with patterns created by the weave using only white yarn. Frequently, baby blankets, robes, and throws use this design. Cotton dishtowels of dobby weave are soft and sturdy.

JACQUARD WEAVE

FIGURE 7. Jacquard weaves are used in tapestries, damask tablecloths, "ugly Christmas sweaters," and this intricate rug pattern. Large, computer-controlled industrial jacquard weaving looms produce these elaborate fabrics.

Jacquard weave is a large complex design controlled by computers. It is woven on a jacquard loom that produces weaves that have floats, luster, stability, and stretch. Luxury memory-foam mattresses are often covered with Jacquard velour covers to provide comfort and elasticity. Jacquard weave is found in brocade, rugs, damask, and tapestry-like items. Brocade is a decorative fabric often made of silk that looks as if it has been embroidered. The name of the fabric comes from the Latin word for "embossed cloth." Rugs are made of wool and synthetic fabrics and have raised motifs featuring stripes and designs. They are made for indoor and outdoor use. Damask is reversible fabric made of silk, wool, linen, cotton, or synthetic fibers. Damask weaves are mostly used in table linens. However, they are also used for clothing and furnishings. Tapestry-like fabrics consist of a warp yarn with colored threads woven by hand to create designs—often pictorial—used for wall hangings and furniture coverings. They can be reproduced by machine.

BROADENING AWARENESS...

AMAZING ASPECTS: Computer-Aided Design

Computer-aided design (CAD) has revolutionized the textile industry. Textile designers convert original designs of painted artwork, fabric samples, and film negatives into the CAD system with scanners or digital cameras. CAD produces design samples without the expense of fabric swatches. Color and patterns can be made easily. In addition, they can be edited and viewed on the computer screen. Corrections and changes can be made instantly without costly refitting on looms. Digital swatches can be saved and retrieved electronically, thereby eliminating the need for costly storage space.

In the textile industry, CAD interprets computerized design in software and customized hardware. Innovative designs are available to textile manufacturers with the click of a mouse. Also, pattern-making software for fashion, footwear, caps, and bags can be customized. The expense and time of textile designing are reduced significantly with CAD, compared with laborious manual methods of design and loom setup.

PILE WEAVE

Pile weave is a technique in which loops are woven into a fabric and extend above the top of the fabric. The loops are cut to form pile. Pile-weave fabric is made of three layers. The first is the foundation layer. The second is an interwoven layer of fibers that act as a cushion for the third layer—the actual pile. Looped yarn has a raised look. The feel is plush, and the texture is resilient. Fabric examples are corduroy, velvet, velveteen, velour, and loop-pile carpeting.

FIGURE 8. This pile-weave carpeting has a lush appearance.

Corduroy

Corduroy is composed of twisted fibers that lie parallel to each other to form the cloth's pattern: a "cord." It is a durable cloth used for trousers, jackets, and shirts, as well as for upholstery. The width of the cord is the "wale."

Velvet

Velvet is woven on a special loom that weaves two thicknesses simultaneously. The two pieces are cut apart to create a pile effect, and the cut threads are evenly distributed as a very smooth, short dense pile. Velvet is used in apparel and upholstery.

Velveteen

Velveteen is imitation velvet. It is usually made of cotton, but it is sometimes made of blends. Velveteen has a shorter pile that alternates with a plain depression. It has more body than velvet, but it has less sheen and does not drape as well.

Velour

Velour is plush, knitted fabric. It is made from cotton or synthetics and combines the elasticity of knits with the feel of velvet. Uses include clothing (e.g., dancewear and leotards), upholstery (where velour is substituted for velvet), theater drapes, and stage curtains.

Loop Pile

Carpets made of loop pile range from low, flat pile to thick, luxurious shag. They are woven in a variety of textures and lengths. The loops help keep soil on the surface, making the carpets easy to clean.

WEIGHT AND THREAD COUNT

Fabric weight is a measurement in ounces per square yard. Obviously, a higher number per square yard indicates a heavier fabric. Generally, fabrics are described as lightweight, medium weight, or heavyweight.

Thread count is the number of warp and woof threads per square inch. It describes the closeness of the weave and denotes the number of warp and woof yarns. **High count** is 160 or more threads per square inch. A higher count indicates a better quality as well as more softness. In contrast, **low count** is less than 160 threads per square inch. A lower thread count indicates a lower-quality fabric. As a result, the hand is less desirable.

Summary:

Twisted fibers are made into yarn that is woven into cloth on looms. Weaving is a process of interlacing lengthwise yarns with crosswise yarns, usually at right angles. Different weaving patterns are used for various materials and purposes.

Plain weave is simple, durable, and flat, with a tight surface on which prints and other finishes can be applied. Basket weave has a looser construction than plain weave. It is more flexible and stronger, but it is less stable. Satin weave produces sateen and satin. Twill weave creates a pattern of diagonal parallel ribs. Dobby weave is produced with a special loom attachment and features woven-in designs, which can be small, intricate geometric or floral patterns. Jacquard weave can encompass large complex designs, often controlled by computers. Pile weave is made of looped yarn that has a raised look.

Fabrics are described as lightweight, medium weight, or heavyweight. Fabric weight is a measurement of how much the fabric weighs in ounces per square yard. Thread count describes the closeness of the weave and denotes the number of warp and woof threads per square inch. A higher count indicates a better quality and more softness. In contrast, a lower thread count indicates a lower-quality fabric.

Checking Your Knowledge:

1. Describe how weaving produces cloth.
2. Explain the purposes of warp, woof, weft, and fill.
3. What are the differences between lengthwise, crosswise, and bias grains?
4. List six weaving patterns.
5. How does thread count determine a fabric's value?

Expanding Your Knowledge:

Baskets have been found that are 12,000 years old. Once used exclusively for practical purposes, basket weaving has now developed into an art form. A coiled basket requires $^{3}/_{16}$-inch cotton clothesline or rope, a #16 blunt-end tapestry needle, 4-ply knitting worsted-weight yarn, masking tape, and scissors. You can find instructions to make your own baskets at http://www.life123.com/hobbies/knit-crochet/weaving/basket-weaving.shtml.

Web Links:

Fabric Weaves
http://budgetdecorating.about.com/od/designresources/ss/Fabricweaves.htm

Looms
http://images.search.yahoo.com/search/images?_adv_prop=image&fr=aaplw&va=weaving+looms

Jacquard Weaving and the Magnolia Tapestry Project
http://www.magnoliaeditions.com/wp-content/uploads/2012/03/Magnolia_Tapestry_Proj.pdf

Thread Count
http://www.linenplace.com/product_guide/truth_about_thread_count.html

Twisted Yarns
http://www.stgeneve.com/quality_defines/covering/twisted_yarns.htm#twisted_yarns