

Fabric Structures: woven, knit, non-woven

Fabric structures are flexible planar materials produced with yarns (occasionally just fibers) that are either interlaced, inter-looped, tangled or bonded together.

Woven fabric: interlacing of 2 sets of yarns at right angles

Knit fabric: inter-looping yarns, horizontally or vertically

Non-woven fabric: random order of yarns or fibers held together with various methods

Textile Structure Categories & Subcategories

Wovens		Knits		Non-wovens
Basic Weaves	Complex Weaves	Filling (weft) Knits	Warp Knits	
Plain Plain-basket Plain-rib Twill Satin	Leno Slack Tension Pile Figure: Dobby Jacquard Gauze Crepe Double Surface: Spot Swivel Lappet	Single: Plain Jersey Jersey variation Jacquard jersey Purl Double: Plain double Jacquard double Interlock Sliver (pile)	Tricot Raschel: Lace Net Sliver (pile)	Multiple methods that are neither wove nor knitted

Woven Fabrics: Introduction

Woven fabrics are the result of interlacing two sets of yarns at right angles: warp (lengthwise yarns) with weft (also called filling—crosswise yarns). The loom is the equipment used to make the fabric. The loom is “warped” with yarns in the lengthwise direction held under tension. Filling yarns are inserted at right angles to the warp in various patterns. Looms can be very simple devices or complex machines. Today there are craft looms, small production looms and high-speed commercial looms all using the same basic principles. The best way to learn about woven fabrics is to take a hands-on introduction to weaving class.

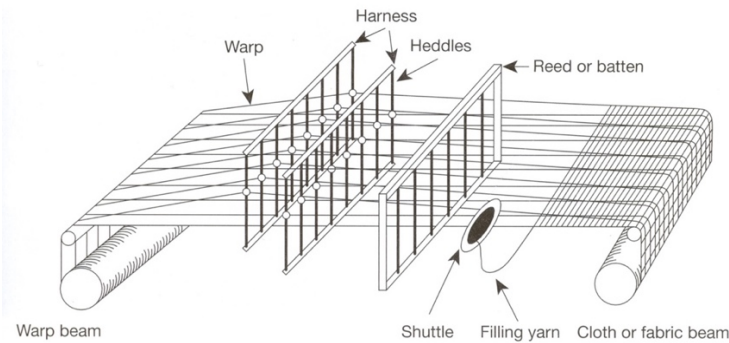


Illustration of a basic loom. From left to right:

The *warp beam* holds *warp yarns* that are pulled through the *eyes* of *heddles* that are held in *harnesses*. The illustrated loom is a 2-harness loom—in this example warped to form a plain weave fabric. All odd numbered yarns go through one harness set of eyes and all even numbered yarns through the other harness eyes. Then the warp yarns are threaded through a *batten (reed)* wrapped around the *fabric (cloth) beam*. Then the weaving can begin by moving the heddles (one up, one down) to form a *shed* where the *filling yarn* is inserted. A *shuttle* holds the filling yarn to slip through the shed. After the shuttle carries the filling yarn from one side to the other, the weaver uses the *batten (reed)* to firmly push the filling yarn in place against the previous filling yarn. Then the heddles are reversed to move the warp yarns to encase the filling yarn. As the fabric is woven it is wound onto the *fabric (cloth) beam*. There are many weaving videos available on *youtube*. A fun one is from Mount Vernon—demonstrating a loom used during President Washington’s time: <https://www.youtube.com/watch?v=FnbUF0wgIfw> (Retrieved 5/5/26)



Traditional wooden floor looms producing *Donegal wool tweed*, Ardara, Donegal, Ireland.

Photo: K. LaBat



Production Loom
Sauer 400S Rapier Loom (1980)

Source: ClemRutter, CC BY-SA 4.0
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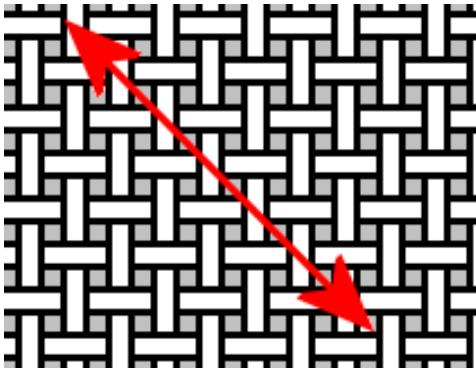


Illustration of woven fabric: filling (crosswise) yarns interlaced with warp (lengthwise) yarns. Red arrow indicates the *bias* direction.

Source: PKM at the English-language Wikipedia, CC BY-SA 3.0 <<http://creativecommons.org/licenses/by-sa/3.0/>>, via Wikimedia Commons
[https://commons.wikimedia.org/wiki/File:Bias_\(textile\).png](https://commons.wikimedia.org/wiki/File:Bias_(textile).png)

In a typical woven fabric, the warp yarns are the strongest and have the least stretch. The warp yarns are held on tension to withstand the wear-and-tear of the weaving process—up-and-down motion and the batten moving repeatedly along the yarns. The filling yarns have slight give as they are woven into the warp—resulting in a more “relaxed” yarn. When laying out sewing patterns on fabric—lay a piece so that the direction where you want least stretch is oriented along the warp direction. For example, pants patterns are usually placed so that the length of the pant piece is parallel to the warp. If you “break the rule” and place the pieces in the filling direction, the knee of the pant may “bag out” when worn.

The bias direction is the 45-degree angle to warp and filling yarns (arrow). In a woven fabric bias has the most stretch. Bias is often used for special effects—giving a soft flowing drape when positioned in the length direction of the body. The right and left side “edges” of the fabric are each called a *selvedge*, for “self-edge” as the weaving process forms the lengthwise edges of the fabric.



Photograph Courtesy of the Goldstein
Museum of Design, University of Minnesota

See link below

The gown pictured above is a mid-1930's evening dress entirely cut on the bias. Note the form fitting shape of the bodice and the skirt. It is made of rayon satin. Go to the Goldstein Museum of Design, University of Minnesota (link below) to see multiple views and details:

<https://goldsteincollection.rediscoverysoftware.com/mDetail.aspx?rID=1967.002.013a-b&db=objects&dir=GOLDSTEIN> (Retrieved 5/2/26)

Woven Structures: Basic Weaves

Basic weaves include plain weave, twill weave, and satin weave

Plain Weave

Plain weave is the most common weave—used for many fabric types and uses. It forms a good foundation for performance and appearance (like printing) finishes. The weave typically looks identical front and back but can be “unbalanced” with either warp or filling yarn packed in more closely.

Plain weave characteristics (depending on other variables and yarn count):

- Firm construction
- Wears well
- Doesn't ravel as easily as others
- Often provides background for surface design and finishes

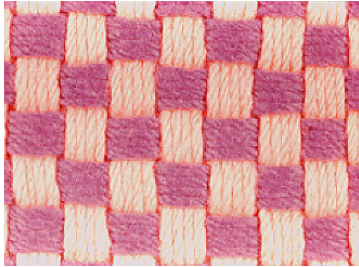
<https://drkrinfabricprof.com>

- May wrinkle
- No surface interest caused by the weave

Plain weave fabric name examples: China silk, gingham, muslin, voile, organdy, organza and many more

Plain weave variations: *basket weave*, *repp weave* and *rib weave*

Basket Weave groups two or more yarns that act as one.



Basket Weave Characteristics:

- often decorative
- usually low yarn count
- often low twist yarns

Basket weave fabric name examples: oxford shirting, monk's cloth

Plain Weaves with a rib feature: filling direction or the warp direction

Repp Weave—thicker yarns or bundles of yarns in the filling (crosswise) direction



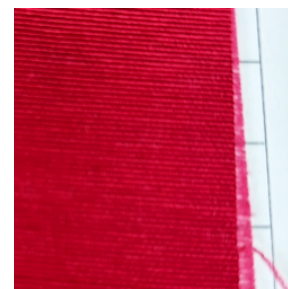
Clutch purse, taffeta lining with moiré pattern, France, 1925-1935

Photo courtesy of the Goldstein Museum of Design, University of Minnesota

<https://goldsteincollection.rediscoveverysoftware.com/mDetail.aspx?rID=1976.015.044&db=objec&dir=GOLDSTEIN>

Retrieve May 9, 2026

Faille fabric
Photo: K. LaBat



Repp Weave Characteristics:

- obvious visual ridges in the crosswise direction or run your fingernail down the length of the fabric to feel the ridges
- adds visual interest, texture and sometimes strength

Repp Weave Fabric Name Examples:

- Silk or silk-like fibers: tissue faille, faille, taffeta, bengaline, repp upholstery, ottoman,
- Cotton or cotton-like fabrics: poplin, broadcloth



Wedding dress bodice of green silk faille, 1860-1870

Source: Courtesy of the Missouri Historical Society, St. Louis, Attribution, via Wikimedia Commons

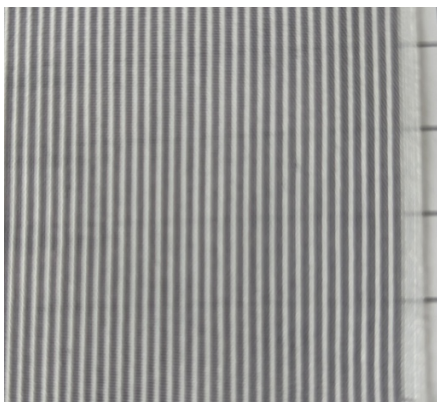
https://commons.wikimedia.org/wiki/File:Green_Silk_Faille_Wedding_Dress.jpg (Retrieved 5/5/26)

Rib Weave—thicker yarns or bundles of yarns in the warp (lengthwise direction)

Rib Weave Characteristics:

- visual ridges in the lengthwise direction
- yarns often different colors to add visual interest
- typically cotton or cotton-like fibers

Rib Weave Fabric Name Examples: Bedford cord, baby cord



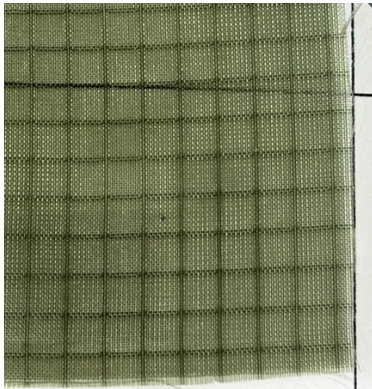
Bedford cord
Photo: K. LaBat

<https://drkrinfabricprof.com>

Ribs in both directions:

Fabrics with “ribs” in both directions are made for visual interest or strength. There are two distinct fabrics that demonstrate these features:

- cross-bar dimity is made with cotton or cotton-like yarns. It is lightweight and typically a summer-weight fabric for blouses, dresses, or baby wear. Often featuring a small flower print.
- rip-stop typically is made with nylon yarns. The larger yarns spaced in both directions are used to make a strong “rip-stop” fabric, implying that if the fabric rips, the rip stops at the larger yarns.



Rip-stop
Photo: K. LaBat

Next Section on *Twill Weave* and *Satin Weave*