

The Three Basic Structures

In weaving, we use only three structures: plain weave, twill, and satin. Most of the time, the other structures are combinations or derivatives of these three.

Plain weave is the fundamental weaving structure, the one we begin with when we start to weave. It is the simplest to make. The majority of fabrics made in the world are made in plain weave. It is a very sturdy solid fabric because it has the maximum intersections. Each weft passes over and then under adjacent warp ends. No yarn can move, systematically surrounded by intersections all around it. The construction of plain weave is simple and uniform. Its basic unit is two warp and two weft; each weft thread alternates passing below, then above each warp end, with a shift of one thread for each pick. To prepare for a weft row, all even warp ends are lifted. For the return of the shuttle, these same even-numbered yarns are lowered and the odd warp ends are raised. Two shafts are enough to weave the fabric.

Twill contains floats, portions of warp or weft yarn that cross over or under two or more neighboring threads. The floats are not at the same place from one pick to the next. Each row is **offset** by one from the row above, so the floats create a diagonal pattern. At least three shafts are needed for twill, but most are made with four shafts, which allow for the weaving of the three basic twills. In 2/2 twill the weft thread passes **under 2**, then **over 2 warp ends**; for 1/3 twill the weft thread passes **under 1** then **over 3 warp ends**; and for 3/1 twill the weft thread passes **under 3** then **over 1 warp end**. The two sides of 2/2 twill are identical; the back of 1/3 twill is same as the front of 3/1 and vice versa.

Like twill, **satin** is composed of floats. The difference is that **the intersections never touch each other!** So the floats become much freer, and move closer to each other, laying over interlacing points until they are hidden. This gives the impression that the yarns are simply laid next to each other without the interruption of any intersections. The yarns appear to be continuous, without any break, and so reflect the light more and become brighter. At least five shafts are needed. The offset of two or three shafts in threading or tying up gives the name to the type of satin. A satin offset by 2 or 3 is called a 2 or 3 satin. Satin cannot be woven on six shafts. It is actually twill weaves that are offset by 1 and 5, and those with 2, 3, and 4 never activate some of the six shafts. With seven or more shafts, we multiply the alternatives: offsets of 2, 3, 4, 5, 6, 7, and more are possible. All this will be explained in much more detail in the section about basic structures (see page 123).

These three basic structures can be used to produce derivative structures that will combine them, repeat them, move them, or group them in different ways. These new structures are grouped by families, according to their similarities.

Some other fabrics do not come directly from these three basic structures, although they are made on a loom, and take certain liberties by introducing knots, twists, and hand sorting of yarns, such as velvets, brocades, knotted stitches, leno, etc.



Figure 19 Plain weave

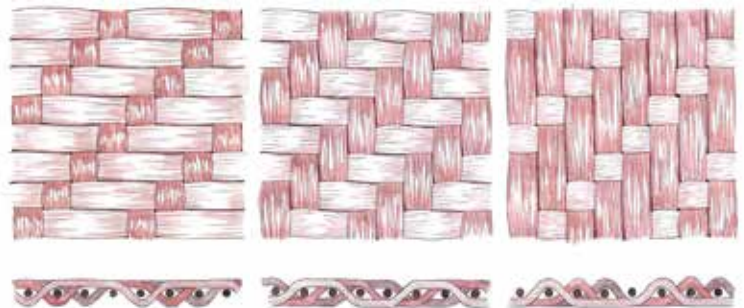


Figure 20 1/3, 2/2, and 3/1 twills

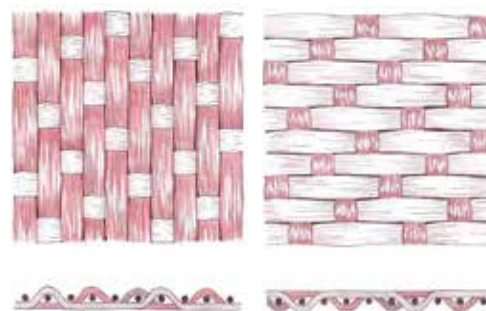


Figure 21 Warp- and weft-faced satin