

SWATCH PAGE

DOUBLE WEAVES WITH 4, 6 AND 8 HARNESSES

by Paul O'Connor

I first became fascinated with double weaves when I saw the work of Richard Landis and Kay Sekimachi in "Beyond Craft: The Art Fabric." Although the severe geometrical patterns that Landis weaves are quite different in final effect from the lacy hangings done by Sekimachi in monofilament nylon, the weaving techniques are closely related. In this series of articles I will start with the fundamentals of weaving double layer materials with four harnesses and progress to six and eight harnesses. A rising shed loom (jack loom) will form the basis for all discussions.

Harriet Tidball's monograph #1 "The Double Weave: Plain and Patterned" is probably the best reference covering most aspects of double weave but I must confess that I find it difficult reading. Peter Collingwood discusses a variety of multilayer weaves for rugs in "The Techniques of Rug Weaving" and Mary Elizabeth Laughlin gives clear and detailed instructions for backed and double cloth in "More Than Four." And of course many of the standard books on weaving, for example Else Regensteiner or Mary Black, have sections on double weaves. But first let's look at the types of things that can be done with double weave.

I. Double Weave Possibilities

Since two harnesses are required to weave one layer of cloth in plain weave, a loom with four harnesses can be used to weave two layers of cloth, each in plain weave. A six harness loom can be used to weave three layers; and with an eight harness loom, you can weave two layers with each layer having all the possibilities of four harness pattern weaves such as twills or overshot. But we are getting ahead of ourselves.

The separate layers of double weave can be interchanged from top to bottom to form pockets, to bend warp colors, or to create three dimensional forms. There are basically four different ways to treat the layers of cloth in double weave.

1. Two separate layers can be woven. These layers can be interchanged or stitched together (this usually requires more than four harnesses).
2. The two layers can be joined at one selvage to give a single cloth that opens up to twice the width when taken off the loom.
3. The two layers can be joined at both selvages to create a woven tube.
4. Using pickup techniques, the weaver can alternate top and bottom layers to create any pattern desired. The two layers are joined together by the technique into a single layer.

The first four articles in this series will treat each of these techniques separately and will offer some example of how they can be used in a variety of ways.

II. Four Harness Double Weaves

A. Threading and Tieup

Straight draw twill threading is used for double weaves. Figure 1 shows the threading, with the top layer woven with harnesses 1 and 3 and the bottom layer with harnesses 2 and 4. The warp threads will be indicated by the corresponding harness number in these articles (although often the two sets of warp threads are indicated as light and dark). The sett for double weaves is usually twice that for weaving a single layer and two warp threads, an even and an odd, are drawn through the same dent of the reed. It may be convenient to use a more open reed and draw four or more threads through the same dent. This can reduce abrasion of warp threads and also makes it easier to change top and bottom warp threads when bending warp colors (see below). Just remember to have an equal number of even and odd numbered warp threads in each dent.

			4			4
HARNESS			3			3
#			2			2
			1			1

FIGURE 1. THREADING FOR DOUBLE WEAVE

Before tieups are discussed, we want to examine the weave structure for two separate layers. Figure 2 is a cross section through the two layers of warp threads. Two shuttles must be used. The first shuttle weaves warp threads 1 and 3, and the second shuttle weaves warp threads 2 and 4. The secret in double weave lies in realizing that the top layer(s) must be raised up out of the way when weaving the lower layer(s). This leads immediately to the tieup. In figure 3, the tieup for the top layer is given first. Next the tieup for the lower layer is shown in two parts to remind you that the top layer must be raised for each weft shot in the lower layer. These are put together into a single tieup diagram on the right side of the figure. (Later a skeleton tieup will be presented).

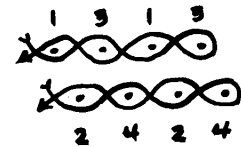


FIGURE 2. WEAVE STRUCTURE FOR TWO SEPARATE LAYERS

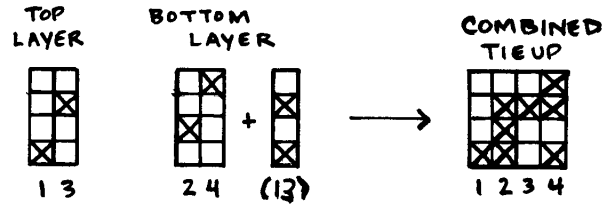


FIGURE 3. TREADLE TIEUP FOR 4-HARNESS DOUBLE WEAVE

B. Weaving Two Separate Layers.

All that is needed to start weaving now is a treadle sequence. Two shuttles are required and it is usually best to alternate picks in the top and bottom layers so that the wefts are beaten evenly in each layer. You may have trouble getting good sheds for the first few weft shots but soon the two layers separate quite well. The treadling sequence follows the treadle numbers in regular fashion.

Treadle #	Shuttle #	Layer being woven
1	1	Top
2	2	Bottom
3	1	Top
4	2	Bottom

Repeat

That's all there is to it! (Excepting for correcting the weaving errors in the bottom layer after removing the piece from the loom). I have seen pictures where a mirror is attached to the loom to let you see the lower layer while weaving but I have not had much success spotting errors using a mirror. Don't forget that you can do all the variations of warp and weft colors and textures in each layer that you can do with two harness weaving.

I want to finish this first article with a discussion of interchanging warp threads so that the top layer becomes the bottom layer and vice versa. This ties the two layers into a single cloth. The photograph shows a double woven sampler with warp threads in yellow and gray, arranged in stripes in the warp. The weft thread is gray for each layer. A type of checkerboard pattern results when the two layers are interchanged. The tieup must be changed so that the warp threads 2 and 4 become the top layer and warp threads 1 and 3 become the bottom layer.

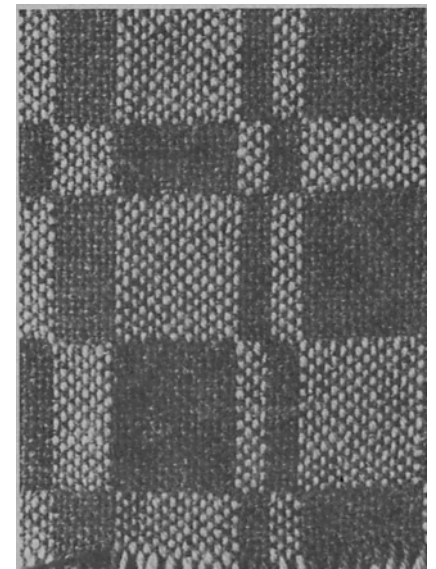


FIGURE 4. TIEUP CHANGE TO INTERCHANGE WARP LAYERS

Figure 4 shows the original tieup and the new tieup side so that you can see what the difference is. The treadling sequence remains the same as before. But now it is time to introduce you to a skeleton tieup that is quite easy to use for a four harness loom. Since four harness looms have six treadles, we can tie up the treadles as shown in Figure 5. The two tabby tieups are on the outside and four single tieups are in the corner. You will have to use both feet in treadling. The treadling sequence is given for each layer on top.

warp 13 top layer warp 24 bottom layer		warp 24 top layer warp 13 bottom layer	
Treadle #	Shuttle #	Treadle #	Shuttle #
1	1	2	1
2 + a	2	1 + b	2
3	1	4	1
4 + a	2	3 + b	2

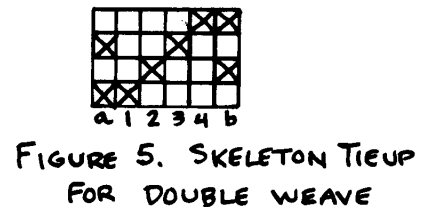


FIGURE 5. SKELETON TIEUP FOR DOUBLE WEAVE

One last point. You can close each selvage by crossing the weft threads for the two shuttles as you weave.

The next article in this series will discuss some more possibilities in weaving two layers and then of on to discuss weaving double width fabrics.