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### Tapestry Technology 1400-2004

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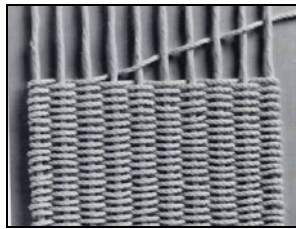
## **Tapestry Technology 1400-2004**

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### **Introduction**

It has been said that in art technique and style are inseparable.<sup>1</sup> So it follows that a deeper understanding of the technology of any given art will deepen our appreciation of it. The particular art under discussion here is western European tapestry.

The term tapestry defines the woven structure you see in figure 1. Tapestry is a simple interweaving of two elements, the structural vertical element, the warp, and the decorative horizontal element, the weft. The interlacing of warp and weft form a grid and it is on this grid that tapestry images are created. This grid also determines the character of the image, in the same manner that colored pieces of glass and lead determine the character of stained glass. With tapestry, by altering the configuration of the grid and changing the number and thickness of the warp and weft, the character of tapestry image can be manipulated. This study traces broadly some of the different ways the grid of tapestry has been used to meet requirements of changing artistic tastes from the Middle Ages to the twenty first century.



*Figure 1. Tapestry.*

Tapestries are woven as follows: 1) Warp yarns are attached to two beams and divided into two sets of threads, odd and even; 2) The weft yarns are wound onto bobbins that the weaver inserts into the open space between the sets of warp yarns which are held apart by the top bar of the loom; 3) When this row is complete, the other set of warp threads is pulled forward, creating a new space, and the weft is inserted in the opposite direction. This means that the weft alternately covers one warp and goes behind the next, over the next, then behind again, and so forth. After several rows of weft have been put in it is beaten down with a comb or with the bobbin to completely cover the warp. This is why tapestry is called weft faced, because all the viewer sees is the weft. Tapestry weft is also discontinuous meaning that it does not go from selvage to selvage. Instead, different colored threads are built up in adjacent areas of contrasting hues to represent discreet design elements.

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<sup>1</sup> Daniel V. Thompson, *The Materials and Techniques of Medieval Painting* (New York, Dover Publications, 1956), p. 9.

The main focus of this study is how specific techniques and features of tapestry weaving have changed historically. For this I have selected five aspects of tapestry production for examination. These are: (1) materials; (2) weaving orientation (the direction in which the tapestry is woven); (3) hatching (4) slits and joins and (5) cartoons. To provide a context for these terms I'll introduce them as they pertain to a specific set of tapestries.

One of the earliest examples of western European tapestry is an impressive series woven between 1360 – 80 (fig. 2). Originally 156 yards long by 6 yards high, it portrayed episodes from the story of the Apocalypse as told by St. John in *The Book of Revelations*.<sup>2</sup> The technical characteristics of these tapestries are relevant because they set a precedent for how tapestries would be woven for centuries.



Figure 2. *Apocalypse Tapestries at Angers.*  
*Image du Patrimoine, Inventaire Générale SPADEM, 1996, p. 17.*

## Materials

### Warp

The warp is handspun, undyed wool, of two different thicknesses, two and three ply, used randomly throughout the whole set. It averages approximately 12 per inch. Heavier and stronger than the weft, it runs perpendicular or sideways to the image.<sup>3</sup>

### Weft

The weft is finer two-ply handspun wool, dyed with natural dyes of between fifteen and twenty different shades.<sup>4</sup>

### Slits

Because the wefts are discontinuous, where each color turned away from the other to form different elements in the design, a slit occurs between the warps (fig. 4b).

### Stepping

When small slits were left open they were used by the weaver to ‘draw’ the design. To the viewer, this created a delicate, lace-like line as in the eagle’s head feathers in figure 3.

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<sup>2</sup> Francis Muel, Antoine Ruais, Christian de Mérindol, and Francis Salet, *La Tenture de l’Apocalypse d’Angers* (Nantes: Cahiers de l’Inventaire, 1987), p. 57.

<sup>3</sup> Muel, *La Tenture de l’Apocalypse d’Angers*, pp. 63-65. All the technical and historical information about these tapestries is from these pages.

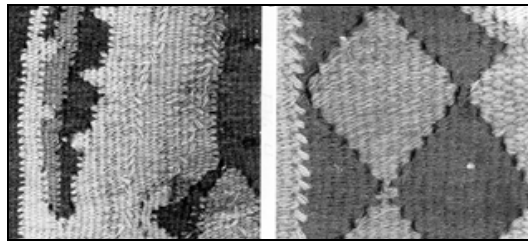
<sup>4</sup> Fabienne Joubert, *La Tapisserie* (Typologie des Sources du Moyen Age Occidental, Fasc. 67, B-I b, 4) (Turnhout, Belgium: Brepols, 1993), p. 26.



Figure 3. Eagle of Woe, *Apocalypse series, Section II, panel 23*;  
*Tapestry of the Apocalypse at Angers, p. 9.*

### **Joins: sewn**

When the weavers did not want to use open slits, there were three ways of closing them. One was to sew the warps together. (In the *Apocalypse* and subsequent tapestry, the colored weft yarns were used and slits were sewn on the loom as the weaving progressed. Later, the slits were sewn off the loom after the weaving was finished). This created a clean line, although the sewing was visible as in figure 4b on the left.



Figures 4a and 4b. Steps, slits and joins in the *Apocalypse*, reverse (detail);  
 Alain Erlande-Brandenburg, ed. *La Tenture del'Apocalypse d'Angers*,  
*Cahiers d'Inventaire 4, Inventaire Générale SPADEM, 1993, p. 65.*

### **Dovetailing**

The second way of joining adjacent areas was to 'dovetail' the wefts around a common warp thread. This created a forking of the two different colors of yarns, and a slightly more jagged line (fig. 4a).

### **Interlocking**

The third way was to join the weft threads between the adjacent warps as they turn away from each other. This is called interlock, and can either be single or double. Of the two methods, double interlock was used most frequently and had to be woven from the back of the tapestry, because the interlocked wefts leave a ridge. On the front of the tapestry however, it is seen as a clean line. Interlock was not used in *The Apocalypse* although it was used frequently in subsequent series.

## Cartoons

A tapestry cartoon is a full-scale drawing or painting of the intended design that is given to weavers to provide a map for the tapestry. During the medieval period, full-scale cartoons were painted in distemper (light washes of color and glue) on strips of linen, or later, on heavy paper or *cartone*.<sup>5</sup>

## Looms

Tapestry looms were either upright or horizontal, or high or low warp. If a low warp loom was used, the cartoon was placed under the warp and the weavers viewed it through the warp threads. The front of the tapestry was visible to them only in small sections with the use of a mirror that they inserted between the warp and the cartoon. Because they wove from the back, the image on the front was the reverse of the image of the original cartoon.

However, on a high warp loom, the weavers have the cartoon behind them and view the cartoon by means of a mirror beside at the side of the loom. Because they also worked from the back of the tapestry, they made the front identical to the cartoon, by working from the mirror image as they wove.

## Weaving

### Warp Direction

Tapestries were woven from the back, with the image perpendicular to the warp, or sideways to the weaver. The angel in figure 5 is shown as it would have been oriented on the loom. When the finished tapestry is in the hanging position, it is rotated 90 degrees clockwise so the angel will be standing. One of the most important reasons for this orientation was that it facilitated the use of hatching.



Figure 5. Section II, panel 27, Angel of the Book. Apocalypse.

Alain Erlande-Brandenburg, ed. *La Tenture de l'Apocalypse d'Angers, Cahiers d'Inventaire 4, Inventaire Générale SPADEM, 1993, p. 18.*

### Hatching

Hatching is a technique used to indicate shading. In tapestry, hatching consists of parallel rows of alternating colored wefts. For example, in figure 5 when the weavers wanted to portray shadows on drapery folds, they worked with a palette of three or four different colors in successive lines (moving from light to dark, or dark to light) to create an appearance of blending and shading. It is simpler to lay in parallel rows of wefts to create this effect than to laboriously join each row of color between the warps.

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<sup>5</sup> Tina Kane, "The Troyes Manuscript: Technology and Design in Fifteenth Century Tapestry" (Earleville, MD: Proceedings of the Textile Society of America, 1998), pp. 130-140.

## Summary

This then, with the exception of a few minor changes, was how Western European tapestries were made for the next five centuries. Warp and weft were wool. Tapestries were woven from the back, and sideways that is, with the design perpendicular to the warp. Hatching indicated shading. The slits were stepped or sewn and dovetailing and interlocking were used. The cartoons were probably joined strips of linen cloth or heavy paper, painted with distemper in *chiaroscuro*. Although people of many nationalities had used the technique of tapestry for many centuries, the combined characteristics discussed above are, I believe, unique to this particular period of tapestry in medieval Europe.

Now, a look at tapestry production from the medieval period to the present. I will divide this into three very general periods, and indicate broadly some of the major features of each.

## Three Periods

### 1350-1850

During the early part of this period, roughly from 1350 to 1500, the materials and techniques discussed above were typically used in a manner that particularly emphasized the unique texture and appearance of woven tapestry.

In the Middle Ages, tapestry was highly valued by the nobility and the church as a symbol of wealth and power. It should be added that tapestry was valued over painting at this time and was significantly more expensive to commission. However, this began to change during the Italian Renaissance as painters came to have more influence than weavers and rhetoricians over tapestry design and production. One of the most important consequences of this change was that tapestry came increasingly to resemble painting. As a result, after the early Renaissance weavers gradually learned to use the materials and techniques of tapestry to resemble painted images. I will begin with how the character of cartoons changed.

### Cartoons

In 1515, Raphael was commissioned by the Vatican to paint a series of cartoons for tapestries depicting *The Acts of the Apostles*. Instead of painting a *chiaroscuro* design with a few color indications, as had been the practice, Raphael provided finished paintings, where every detail of color and design was specified (fig. 6). The tapestries woven from these cartoons had an immense influence on tapestry styles. The cartoons (now in the Victoria and Albert Museum) set a precedent and in the following years cartoons increasingly came to resemble finished paintings. So did tapestries. In fact, within five years of the completion of the Raphael tapestries, there were sufficient incidents of weavers using liquid dyes to paint (rather than weave) facial features such as lips and cheeks that an ordinance was passed prohibiting these practices.<sup>6</sup> How did this effect the how tapestries were woven?

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<sup>6</sup> Thomson, W.G. *A History of Tapestry From the Earliest Times until the Present Day*, (London, Hodder and Stoughton, 1956), p. 218.





Figure 6 (left). Raphael tapestry cartoon, Christ's Charge to Peter.  
(After Sharon Fermor, *The Raphael Tapestry Cartoons*, Scala Books, London, 1966, p. 31).

Figure 7 (right). The Triumph of Apollo.  
(After Guy Delmarcel, *Flemish Tapestry*, Harry N. Abrams, New York, 2000, p. 322).

### Warp Set

One result was that the number of warps per inch increased and the warp became finer. The *Apocalypse* weavers, for example, used 12 or 13 warps per inch but by the eighteenth century, a typical warp count was 20-25 per inch or nearly double as seen in figure 7, a 1717 Brussels tapestry after Jan van Orley. The woven wooden gilt frame heightens the painterly effect and is typical of eighteenth century tapestry.

### Palette

Another change can be seen in the number of colors used. Earlier tapestry had a simple palette of around a dozen hues derived from a small number of reliably stable natural dye sources. But as tapestry became increasingly painterly, the weaver's palette expanded to replicate the artist's paints. By the middle of the sixteenth century in Brussels 20 colors with three to five shades each was common. Some of these dyes were known to be less durable than others but were permitted because of the effect they produced.<sup>7</sup> And by the middle of the eighteenth century, weavers chose from an astounding 30,000 different shades.<sup>8</sup>

### Summary

In the period between 1350 and 1850, the most significant changes were the higher warp count, the expanded palette, and the detailed, painted cartoons. These changes were dictated by tastes that had come to value painting more than tapestry. As a result, images represented in tapestry lost the character of woven image and became increasingly fluid and painterly.

<sup>7</sup> Thomson, W.G. *A History of Tapestry From the Earliest Times until the Present Day*, (London, Hodder and Stoughton, 1956), p. 223.

<sup>8</sup> Valerie Kirk, *Post war directions - Simplified Technique and innovation* (M.A. Honours Thesis, submitted at the University of Wollongong, N.S.W, Australia, 1999), chap. 3, p. 45. On this, Kirk is quoting Pierre Verlet from *The Book of Tapestry* (New York, The Viking Press, 1977), p. 118.

## 1850-1950

As tapestry became more mimetic, the weavers, though skilled artisans, became mainly copyists. Some, such as William Morris, felt that tapestry needed revitalization. And in 1881, he opened his own tapestry workshop, the Merton Abbey Tapestry Works.<sup>9</sup>

### Materials

Morris wanted to reverse the historic trend of painterly tapestry, and in particular to distinguish his tapestries from paintings. To accomplish this he chose thicker materials, a broader warp set, (6 per inch), and a more restricted palette. He wanted to emphasize the materiality of the tapestry, as distinct from a painted surface (fig. 8).<sup>10</sup>



Figure 8 (left). *Angeli Laudentes*.

(from Linda Parry, *William Morris Textiles*, London: The Viking Press, 1993, p. 123).

Figure 9 (right). *Rising Suns over Australia Felix*, John Olsen, *VTW tapestry, det. 1997*  
1884 Merton Abbey tapestry (after Sue Walker, ed., *Modern Australian Tapestries*, Beagle Press,  
Melbourne, 1999, p. 39).

At Merton Abbey the weavers used handspun, naturally dyed woolen warp and weft. However, it should be noted that other contemporary tapestry workshops did not. The use of machine-spun cotton was introduced in the early twentieth century<sup>11</sup> as were synthetic dyes. Otherwise, the characteristics we have seen in earlier periods, slits and joins, hatching and so forth were used traditionally. The weavers, however, were given much more responsibility for artistic interpretation than in previous centuries.

### Summary

Apart from this stylistic change between 1850-1950, the most significant technical changes concerned materials and dyes. Machine spun cotton warp was sometimes used instead of wool; synthetic dyes began to replace natural dyes.

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<sup>9</sup> Linda Parry, *William Morris Textiles* (London: The Viking Press, 1993), p. 102.

<sup>10</sup> Kirk, *Scottish Tapestry Tradition, Technique, Narrative and Innovation*, p. 22.

<sup>11</sup> Alice Zriebiec, *From American Looms* (Trenton: New Jersey State Museum, 1985) pp. 7-15.



## 1950-2001

In the twentieth century, the effort begun by Morris to reform the art of tapestry continued in France, particularly under the influence of Jean Lurçat. But while Morris had been inspired by the Middle Ages Lurçat translated modern images into tapestry. This necessitated yet another change in the way the weavers used tapestry as they now learned to portray abstract rather than representational images.

Also in the last quarter of the twentieth century small new workshops were begun, such as West Dean in West Sussex, England; the San Francisco Tapestry Workshop; the Scheuer Workshop in New York City; and the Victorian Tapestry Workshop in Melbourne. Of these only West Dean and the Victorian Tapestry Workshops are still functioning. All were influenced by what was happening in Europe, but most particularly at the Dovecot Workshop in Scotland under the direction of Archie Brennan. In these smaller workshops a great number of changes in the technology of tapestry weaving took place. This began with a change in the materials used.

### Materials

In the 1960's, woolen warp was abandoned in favor of highly spun cotton Seine twine, originally used for fishing nets, which proved to be superior in almost every way.<sup>12</sup> Machine spun cotton warp has now generally replaced wool warp. Also the most common warp set was fairly coarse, around 6 per inch<sup>13</sup> although this varies considerably from artist to artist. The lower the warp set, the thicker the weft must be to make a strong fabric. Coarser materials also make the weaving go faster. All these workshops now use synthetic dyes as well.

### Weaving

Another change is the direction in which tapestries are woven. In 1963 at Dovecot the weavers began to work directly at the front of the tapestry, discarding the mirror."<sup>14</sup> This spread to other workshops. The weavers say the main benefit was that it helps them in their collaboration with the artist, making it easier to discuss the image as the work progresses.<sup>15</sup> Many tapestries these days are also woven with the image upright (not sideways) parallel to the warp (fig. 9).

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<sup>12</sup> Hodge, *Master Weavers, Tapestry from the Dovecot Studios 1912-1980* (Edinburgh: Canongate Publishing Ltd., 1980), p. 105.

<sup>13</sup> Dumbrell pointed out that the setts used in earlier VTW tapestries were finer and that fine sett tapestries are still woven at the VTW but less often than before.

<sup>14</sup> Hodge, *Master Weavers*, p. 105.

<sup>15</sup> Roland Galice, *La Technique de A à ...X. de la Tapisserie de haute et basse lice et du tapis de Savonnerie*, (Paris: Les Lettres Libres, 1985), p. 57. In contrast, Roland Galice, master weaver at Gobelins, Beauvais and Savonnerie gives three main reasons for a high warp weaver to weave from the reverse instead of the obverse of their tapestry. The first is that the weaver has to pass the bobbins that are not in use behind the warps and then retrieve them again when they are needed. This is complicated and time consuming. Also double interlock has to be done from the back and is therefore more difficult or impossible when weaving from the front. He adds that when bobbins are used to beat from the front, they degrade the surface of the tapestry.

### **Cartoons**

Weavers now used enlarged black and white line drawings for cartoons. Workshop weavers are now collaborative partners with the artist. As a result, the modern workshop weaver is now responsible for making the cartoon themselves from the artist's model or sketch, rather than the graphic artist, as was the case since the Middle Ages.

### **Slits and Joins**

Since double interlock could only be done from the back this is no longer used. Both dovetailing and single interlock, however, can be done from the front and are still common. At the Victorian Tapestry Workshop (VTW) sewing on the loom is used to close slits. In Figure 9 the needles hang with the bobbins on the right.

### **Stepping**

Stepping with small open slits is still in use. But because the fabric is coarser, the effect has changed. The delicate, lacy lines of medieval and Renaissance tapestries are rarely seen.

### **Hatching and *Chiné***

Formal hatching is used less. Some individual artist weavers, such as John Eric Riis in the recent tapestry show at the Textile Museum, demonstrate clearly that hatching is still part of the vocabulary of tapestry, as are many of the other traditional techniques. Even so, often to indicate color change, different colored weft yarns are mixed on a single bobbin. This technique, known as *chiné*, is particularly well suited to weaving large areas of flat color (fig. 10). *Chiné* also tends to make a heavier fabric. At the VTW, for example, up to fifteen weft threads are used on a single bobbin. The texture and appearance of early tapestry was largely determined by the rib of the uneven handspun warp (which was thicker than the weft). Contemporary tapestry is often more uniform, the warp evenly covered by the heavier machine spun weft yarns (fig. 10).

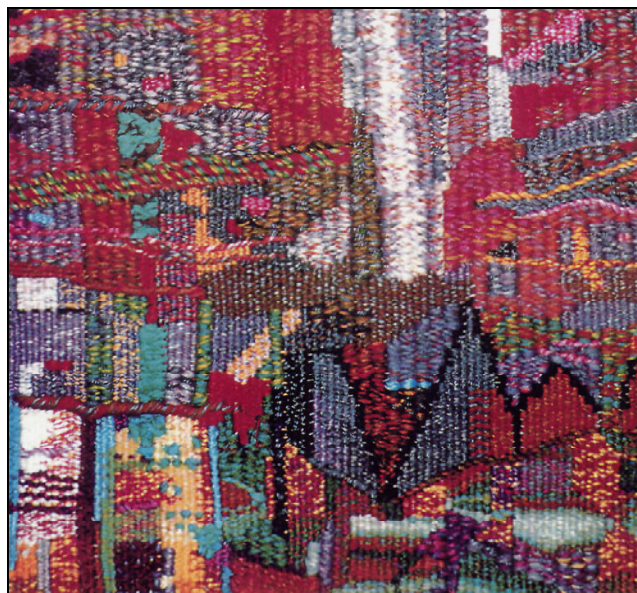


Figure 10. Warm Michael Johnson, VTW tapestry, detail. 1988. (after Sue Walker, ed., Modern Australian Tapestries, Beagle Press, Melbourne, 1999, p. 59.

It is worth noting that hatching was tapestry's signature mark for centuries. Laying in parallel rows of different colored weft seemed particularly suited to the grid of warp and weft in tapestry weave and gave tapestries a unique and distinctive look. More than all the other changes, the diminished use of hatching signals a dramatic separation that clearly divides historic from modern tapestry.

### Summary

Tapestry weaving technology has undergone more major changes in the last half century than in the preceding five centuries. These are: machine spun cotton warp instead of wool; synthetic dyes rather than natural dyes; tapestries woven from the front and often with the design parallel to warp direction instead of sideways and from the back; and the effect of hatching is now often produced by chiné, multiple wefts on a single bobbin which makes the weft thicker than the warp and the tapestry coarser.



Figure 11 (left). *Grand Personnage from Apocalypse at Angers Section III, panel 1, ca.1360.*  
*Image du Patrimoine, Inventaire Générale SPADEM, 1996, p. 4.*



Figure 12 (right). *Pretty As, Richard Larter, VTW tapestry det.198.2*  
*Courtesy, Victorian Tapestry Workshop.*

### Conclusion

What is the significance of these changes? I believe the most significant of these changes has been transforming the weaver from a skilled copyist to a collaborative partner with the designer and artist. This revitalized workshop tapestry in the last century. Now the weaver is free to interpret – not copy – images into tapestry, and to innovate technically to produce modern images.

Have these technical changes affected the artistic integrity of the work? Some might argue that part of the magic of tapestry, the feel and look of it, has suffered. Perhaps it has. But surely the advantages far outweigh the disadvantages. In my opinion without many of these clever adaptations, the art of tapestry might not have survived as a viable art into the twenty-first century.