



CARPETS III. KNOTTED-PILE CARPETS: TECHNIQUES AND STRUCTURES

CARPETS

iii. Knotted-Pile Carpets. Techniques and Structures

The techniques of carpet making are the processes of weaving, knotting, and finishing; structure is the complex of interrelations among the elements of the finished carpet. One of the major problems in carpet studies is the lack of a standard terminology to describe specific techniques, structures, and designs. The nomenclature most widely used in scholarly publications has been adopted here. (For an extensive listing of colloquial terms, see Varzī, pp. 289-99).

Technique. Whether the carpet is flat-woven (see v, below) or piled, the basic components are the warps (*tār, tān, tūn, čella*; [Figure 64a](#)), which run from end to end of the rug, and the wefts (*pūd, pūt*; [Figure 64b](#)), which are passed from side to side alternately over and under the warps, thus binding them together to produce the foundation of the carpet. Each drawing of a weft across the warps is called a “shoot,” or “pass.” In pile rugs supplementary weft yarns, or “knots” (*keft, gereh, ḡond*), are wrapped around the warps between the foundation wefts, then cut; the cut ends project on the surface to form the



pile (*porz*; Figure 65a-c) and create the design. Knots are generally tied to pairs of warps. The two basic types of knots found in Persian carpets are the symmetrical (Figure 65a) and the asymmetrical both of which may be open either to the right (Figure 65b) or, more commonly, to the left (Figure 65c). In earlier carpet literature the symmetrical knot was generally called the Turkish or Ghiordes knot: among Persians in the trade the technique of knotting carpets in this fashion is commonly known as *torkībāf*. The corresponding terms for the asymmetrical knot are Persian or Senna and *fārsībāf*. This older terminology is problematic, however, as both types of knot are used throughout the Near and Middle East, without respect to geopolitical boundaries or the linguistic or ethnic affiliations of the weavers. Knots of either type tied over more than two warps are known colloquially as *joftī* “doubled, paired.” Although the *joftī* technique requires less time and material than tying knots onto every two warps and thus reduces production costs, the resulting decrease in knot density leads to less detailed designs and sometimes to carpets of lower quality.

Despite official adoption of the metric system in Persia (1314 Š./1935), pre-existing systems of carpet measurement, which vary from region to region, are still in use. The standard measure of length is the *darʿ* (cubit), subdivided into 16 units, also called *gerehs*, or knots; the *darʿ* varies in length from 100 to 111.25 cm (40-44.5 inches). Knot density is measured by *raj*, that is, the number of rows of knots per longitudinal *gereh* (6.25-6.95 cm/2.5-2.78 inches). In the West, by contrast, density is determined by the number of knots per square decimeter or square inch.

The loom (*dastgāh*, lit. “equipment,” *dār*, lit. “pole”; Figure 66 is the frame upon which carpets are woven). The warps (Figure 66a) are stretched between two parallel beams (*navard*), which may be fixed or rotating. When the beams are fixed the length of the carpet is limited to the distance between them. With rotating beams, on the other hand, the carpet can be wound around the lower beam as weaving progresses, so that the finished carpet can be longer than the loom. To facilitate weaving, alternate warps are usually separated and raised to make a shed through which weft yarns can be passed. The shed is created by means of a flat shed stick (*pošt-e gūla*, *pošt-e kūjī*, *bača-gord*; Figure 66b), which is inserted under alternate warps; the remaining warps are attached by means of loops, called leashes, to a heddle rod (*šemša*, *vard*, *gūla*, *gord*, *gurt*, *kūjī*; Figure 66c), a bar supported or suspended at each end and extending the full width of the loom. During weaving the shed stick is first turned on its edge,



separating and forcing up alternate warps, and the weft is passed through the resulting shed (*pūd-e rū*; Figure 66d). For the return pass the warps must be reversed: The shed stick is turned flat, closing the shed, and the heddle rod is manipulated to raise the second set of warps, creating the countershed (*pūd-e zīr*), through which the weft is returned.

In Persia looms may be set up either horizontally or vertically. The ends of horizontal looms (*rū-zamīnī*) are usually pegged to the ground, and sometimes the sides are also supported. They can be quickly dismantled and easily transported and are thus favored by nomadic peoples. More commonly used is the vertical (*dīvārī*) loom, the upper and lower beams of which are either linked by two upright poles or posts or are fitted into holes in the side walls of the workroom (*kārgāh*).

The complete weaving process consists of several stages, each demanding different skills. In the commercial setting a highly specialized hierarchy of craftsmen is linked contractually to the manufacturer, or loom owner. Generally weavers in supervised workshops receive wages according to the hours worked and the carpet units woven; cottage weavers usually receive an advance against the price of the completed carpet (Bonine, pp. 167-68; Costello, pp. 125-26; Ehlers, pp. 291-92; English, pp. 92-94, pl. 8a and Appendix B; Gleadowe-Newcomen, pp. 93-94; Ittig, 1985, pp. 118-21 and figs. 1, 5, 8; Parhām, n.p.). The first procedure is to lay the warps on the loom, which may be accomplished either by a professional warp winder (*tārbanda*, *čellakaš*) or by the weavers (*qālī-bāfān*) themselves. When a specific knotting density is required, the upper and lower beams are divided into *gerehs* to ensure uniform placement and number of warps in each unit across the loom. After preparation of the warp several shoots of weft are inserted to create a protective strip of plain weave (*gelīm*). Balls (*gorūk*) of yarn (*kāma*) in the colors required for the pile are suspended from the upper beam. The first row of knots is then tied to the warps across the width of the carpet. In some regions a knife with a hooked point (*gollāb*) is used for tying knots. After each row of knots one or more shoots of weft are passed to hold them in place. The successive rows of knots and wefts are compacted with a comb beater (*šāna*, *dastak*, *daftī*, *daftīn*). In the commercial workshop a head weaver (*ostād*), who may also be the loom owner, is assisted in the actual weaving by one or more apprentices (*šāgerd*).

The sides (*kenār*), the edges of a carpet parallel to the warps, may be finished either by overcasting (*sar-dūzī*) a single cord of warp yarn (Figure 67a) or by



wrapping two or more cords or warps in a circular fashion to produce a selvage (*kenārapīč*; see Figure 67b). The yarns used in overcasting or selvages may be of wool or another fiber. The upper and lower ends of a rug (*sar-e farš*; *tah-e farš*), that is, the edges running parallel to the weft, are usually finished in plain weave (Figure 67); they may have a simple warp fringe, or the warp ends may be braided, knotted, netted, or otherwise embellished. Fringes (*riša*; *ḥāšīa*) may also be added.

Many carpets, notably those of village or nomadic origin with traditional designs, are woven without a particular pattern guide. The weaver may also work from a cartoon (*naqša*), in which the design is executed on a paper grid, each square (*kāna*) representing one knot (see iv, below). Alternatively, a knotted “sampler” (*vāgīra*), in which a section or sections of the field and border are depicted, may be used as a model (see iv, below).

Although preliminary trimming (*čīdan*) of the pile occurs during the weaving process, the final clipping (*pardākt*) is undertaken by an experienced finisher (*pardāktčī*). Both offset scissors (*qeyčī*) and a sharp trimming knife (*kārdak*) are used to reduce the pile. After the completed carpet is removed from the loom it is washed. In addition to detergent, a variety of chemicals may be added to the bath in order to alter the rug’s colors according to market demands (Edwards, p. 30, 140 n. 2, 142).

Structure. Structure must be taken into account, along with stylistic features, documented inscriptions, and archival and historical sources, in classifying Persian carpets. The type, spin, ply, and diameter of the fibers; the number of weft shoots and degree of weft tension; and the knot type and knotting density are all factors that influence carpet structure. For example, quite different structures can be produced by varying weft tension because the degree of weft tension determines the extent to which alternate warps will be displaced. If none of the wefts is pulled taut, the warps will lie on the level (*takt*), and both nodes of each knot will be visible on the back of the rug. If the warps are closely laid and the tension of one weft is greater than that of the next, alternate warps will be displaced, or depressed, creating two different levels of warps; on the back of the rug one node of each knot will be at least partially concealed. In the former structure the warps are commonly referred to as level or flat and in the latter as depressed.

The structures of Persian carpets are extremely varied; in general each is associated with a specific carpet-producing region or group. One distinctive



structure that has been described in the literature was originally associated with various designs in which vases figure and is therefore often called the “vase technique.” It consists of a particular type of triple-wafted weave with asymmetrical knots open to the left and is found in certain pieces attributed to Safavid production (Beattie, pp. 14-15; Martin, 1908, p. 76; see ix, below). Today triple-wafted carpets are produced in both the Kermān and Bījār areas, but, because of variations in other components of their weaves, quite different structures result (Azadi, nos. 29-31; Edwards, p. 205; Ittig, 1981, table I; 1985, table I).

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