TEXTILE TOOLS FROM AKROTIRI

A total number of 38 loom weights were recorded in the database. All the objects have been found in the same building (settlement – household - sector B) and have the same date (LC I). 20 loom weights were found in together "*In the middle of the room B2, among large number of ceramic.*" The other loom weights were found in different layers and places in sector B.

All the loom weights are made of fired clay and have a discoid shape (figure 1). Of the 20 loom weights from the middle of the room, 18 have discoid rounded shape and 2 have a discoid elliptical. The majority of the loom weights are considered to have been made in a medium production quality.

Type	Number
discoid	3
discoid elliptical	6
discoid rounded	29

Figure 1. Distribution of the shape of the loom weights.

25 loom weights are recorded as *complete* or *small fragments missing*. A comparison between the weight and thickness of the complete loom weights and the loom weights with small fragments missing demonstrates that they fall within the same range (figure 2). On the basis of the pictures we judge that the margin of error is less than 10% and we have therefore included loom weights with small fragments missing in this analysis.

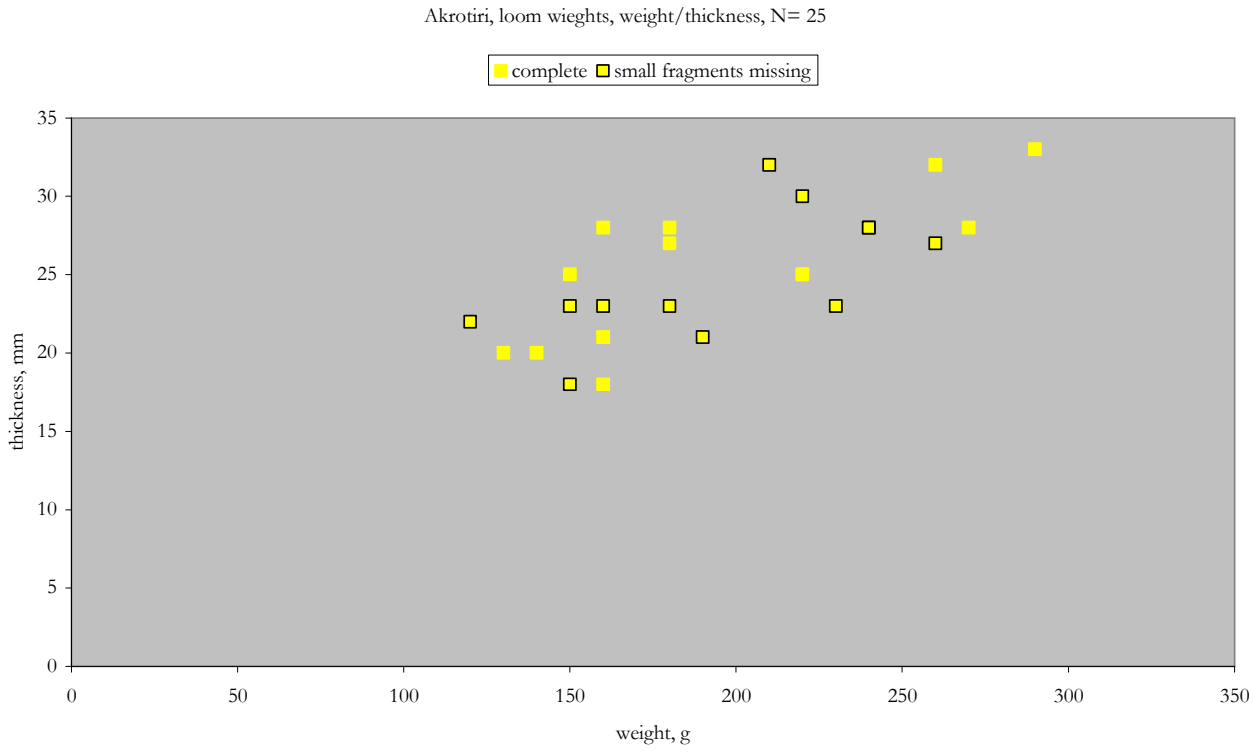


Figure 2. Complete and slightly fragmentary loom weights.

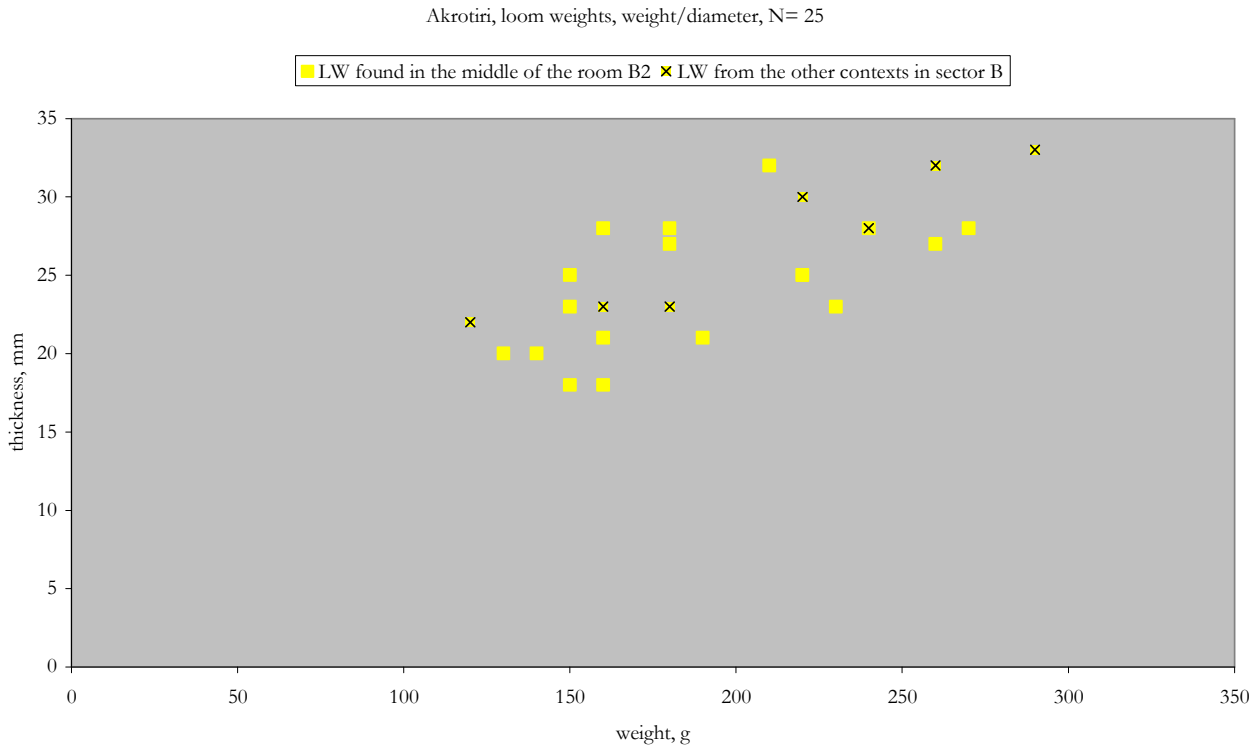


Figure 3. The relationship between loom weights found in the middle of room B2 and loom weights found other contexts in room B2.

As can be seen in figure 2, there is no difference between the loom weights found in the middle of room B2 together with a large amount of pottery, and the loom weights from other contexts in sector B.

12 loom weights have a groove on the upper most edge above the hole. 9 have a discoid rounded shape and 3 loom weights have an elliptical discoid shape. There are no clear differences between the grooved loom weights and loom weights without groove regarding weight and thickness (figure 4).

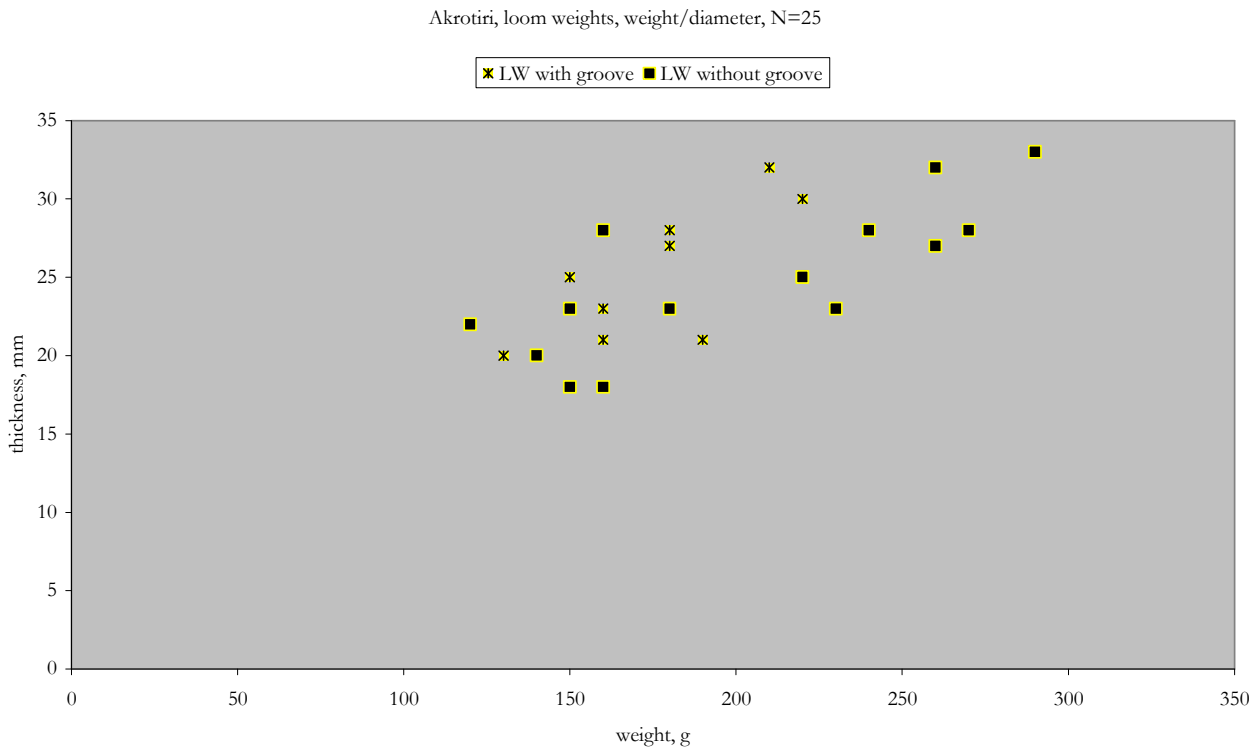


Figure 4. Weight and thickness on loom weights with and without grooves.

To elucidate our interpretation of the loom weights, we have calculated some possible loom setups on the basis of 3 weights from this context. Two are from room B2 (AKR-3706h and AKR-3706i) and one is from context "Base 6" (ARK-618). We have chosen the lightest complete loom weight, the heaviest complete loom weight and finally a complete loom weight which represents the average of the loom weights. Please note that these suggestions are based on our experience and experiments but are on the other hand conjectural as to what is optimal.

Loom Weight AKR 3706h, weight 130g, thickness 20 mm				
	A	B	C	D
Warp threads requiring	10g warp tension	20g warp tension	30g warp tension	40g warp tension
Number of threads per loom weight	13	6-7	4	3
Number of threads per two weights (one in front layer one in back layer)	26	12-14	8	6
Warp threads per cm	13	6-7	4	3
Our evaluation of tools suitability	TTTC choice	TTTC choice	Possible	Unlikely

Figure 5. Calculation of possible setups with loom weight AKR 3706h

The calculation demonstrates that the fabric could have had 6-13 warp and weft threads per cm (if weft faced 12-26 threads in weft per cm). Thin warp threads with a tension from 10 to 20 g would function best on this loom weight (figure 5). The types of fabrics that could be produced with this loom weight would be of fine quality. However, depending on which type of warp thread that was chosen the fabrics would be completely different. The fabric produced in a setup like example A would be quite dense while the fabric produced in a set up like example B would be open and veil like(figure 6 and 7). Also, if the two fabrics were weft faced they would differ visually (figure 7).

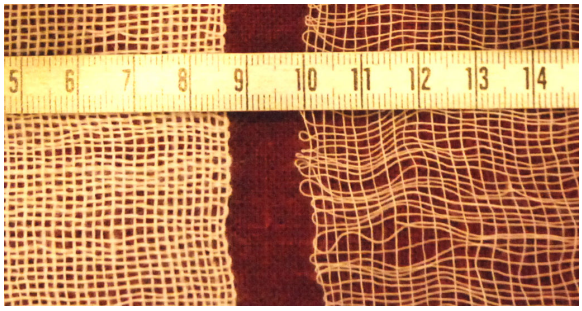
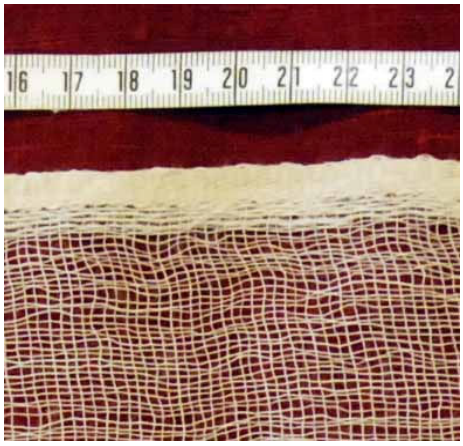


Figure 6. Two fabrics with threads requiring (left) 20g warp tension with approximately 6 warp threads per cm and 7 weft threads per cm and (right) 10g warp tension with approximately 5 warp threads and 8 weft threads per cm



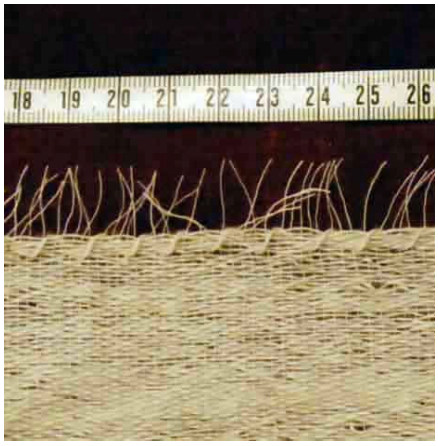


Figure 7. Two fabrics, both woven with threads requiring 10g warp tension. Left: a tabby with app. 5 warp threads per cm and 8 weft threads per cm. Right: a weft faced tabby with app. 6 warp threads per cm and 15 weft threads per cm.

When focusing on TTTC choice A, (figure 5), we suggest the following loom setup:

Loom setup (AKR 3706h) calculated on 10g warp tension:
Starting border (width of the fabric): 100 cm
Number of loom weights needed: 100
Numbers of warp threads: 1300 threads 2 m each= 2600 m
Weft 1: if a balanced tabby =2600 m
Weft 2: if a weft faced tabby =5200 m
Total amount of yarn with weft 1 (+ 2%) =5304 m
Total amount of yarn with weft 2 (+ 2%) = 7956 m

The calculations demonstrate that the amount of yarn needed is substantial. According to the TTTC experiments it would take approximately 152-227 hours to spin the thread needed to produce the fabric in this setup. Time for sorting and preparing the fibres is not included, neither is time for preparing the setup, weaving and finishing. It should also be noted that in order to spin this type of thread the wool has to be of a high quality and very well prepared before spinning.

Loom Weight AKR 618, weight 290g, thickness 33mm				
	A	B	C	D
Warp threads requiring	10g warp tension	20g warp tension	30g warp tension	40g warp tension
Number of threads per loom weight	29	14-15	9-10	7
Number of threads per two weights (one in front layer one in back layer)	58	28-30	18-20	14
Warp threads per cm	17-18	8-9	6	4
Our evaluation of tools suitability	TTTC choice	TTTC choice	TTTC choice	Possible

Figure 8. Calculation of possible loom setups with loom weight AKR 618.

The calculations demonstrate that a warp thread with 10-30g tension would function best on this loom weight (figure 8). Depending on which type of thread that was chosen the fabrics would be completely different in quality and appearance. Also, if the fabrics were weft faced they would differ visually.

When focusing on TTTC choice B, (figure 8) we suggest the following loom setup:

Loom setup (AKR 618) calculated on 20 g warp tension:
Starting border (width of the fabric): 100 cm
Number of loom weights needed: 60
Numbers of warp threads: 900 threads 2 m each= 1800 m
Weft 1: if a balanced tabby = 1800 m
Weft 2: if a weft faced tabby = 3600 m
Total amount of yarn with weft 1 (+ 2%) = 3672 m
Total amount of yarn with weft 2 (+ 2%) = 5508 m

The calculations demonstrate that the amount of yarn needed is substantial. According to the TTTC experiments it would take approximately 92-138 hours to spin the thread needed to produce the fabric in this setup. Time for sorting and preparing the fibres is not included, neither is time for preparing the setup, weaving and finishing.

Loom Weight AKR 3706i, weight 220g, thickness 25 mm				
	A	B	C	D
Warp threads requiring	10g warp tension	20g warp tension	30g warp tension	40g warp tension
Number of threads per loom weight	22	11	7	5-6
Number of threads per two weights (one in front layer one in back layer)	44	22	14	10-12
Warp threads per cm	17-18	8-9	5-6	4
Our evaluation of tools suitability	TTTC choice	TTTC choice	TTTC choice	Possible

Figure 9. Calculation of possible loom setups with loom weight AKR 3706i.

The calculations demonstrate that a warp thread with 10-30g tension would function best on this loom weight, which is exactly the same tension that could be produced with the loom setup based on loom weight AKR 618 (figure 9). Also here the fabrics produced would be visually different depending on the thread chosen.

When focusing on TTTC choice C (figure 11), we suggest the following loom setup:

Loom setup (AKR 3706i) calculated with 30 g warp tension:
Starting border (width of the fabric): 100 cm
Number of loom weights needed: 80
Numbers of warp threads: 600 threads 2 m each= 1200 m
Weft 1: if a balanced tabby = 1200 m
Weft 2: if a weft faced tabby = 2400 m
Total amount of yarn with weft 1 (+ 2%) = 2448 m
Total amount of yarn with weft 2 (+ 2%) = 3672 m

The calculations demonstrate that the amount of yarn needed is substantial. According to the TTTC experiments it would take approximately 49-75 hours to spin the thread needed to produce the fabric in this set up. Time for sorting and preparing the fibres is not included, neither is time for preparing the setup, weaving and finishing.

DISCUSSION

All the three weights could be functional in producing different fabrics with a variation of thread qualities but with a focus on fine qualities with very thin threads. On the other hand the loom weights found together in room B2 would not be optimal to be used in the same loom setup since the weight varies from 130-270g and the thickness varies from 18-32 mm. However two of the weights (AKR 618 and AKR 3706i) could have been used in the same setup even if they are not from the same context. These two weights are very flexible and could be used for a larger variation than the lighter ones, even for fabrics with coarser threads. It is reasonable to believe, however, that if the Akrotiri weavers wanted to produce coarser textiles with thicker threads they would have chosen heavier and thicker loom weights instead, because that would reduce the number of loom weights needed. Heavier and thicker loom weights, however, would not have been as flexible as the loom weights from Akrotiri, since heavier weights are not suitable to produce fabrics with many and thin threads (see e.g. p 13 in the introduction).

A majority of the loom weights were made in a medium production quality and it is interesting that so many are found together and in connection with a lot of pottery. The number of loom weights needed for one setup is substantial even if the width of the fabric was considerably smaller.

The production suggested with the three examples required a substantial amount of yarn in different qualities. The time it took to produce the thread differs much depending on the type and size of the textile. In the examples discussed above the labour consumption, 49 hours at least and 227 hours at most, presumably also indicate the value of these textiles. The production of the finest fabrics would have taken a considerable period of time to make and demand well prepared raw materials, even-spun threads and a developed knowledge on weaving techniques. From our experience, we can also add that the setup and weaving with many thin threads takes is much more time consuming than the setup and weaving of a coarser fabric.

The number of objects recorded in the database is small and must not be considered statistically representative for Akrotiri in general. However, the results based on the loom weights found in this room demonstrate a production of a variety of high quality textiles with thin threads. It is most likely that the weavers were skilled crafts people, who knew how to weave and which tools they needed to produce certain qualities.