Loom Weights

An experiment to ensure even weight of all weights in a loom.

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**Introduction**

During our visit to Archeon I noticed that they had replicas of warp-weighted looms with ceramic weights in most of the houses up to the area of the Middle Ages. The earlier examples used ring-shaped weights, while latter (closer to the Roman Age) ones used triangular, almost conical, weights with the warp threads attached through a hole at the top. This led to me questioning which one was more efficient, and how they ensured they were all the same weight. I have thus decided to experiment with the production of the ring-shaped weights. How does one ensure that all weights (from 5 up to 30 or more depending on intended resulting fabric) in one loom, or all looms, are as identical in weight as possible? Since small differences in tautness can cause an uneven, or even failed, result of the weave, it is a small but important detail. Which method of the three described below (mould, following an example, using a coil) would be the easiest, yet most likely to form even weights?
The Question

The idea of this experiment is to find which method was more likely to be used, to create even weights both in size and how much they weigh to be used in a warp-weighted loom. Unfortunately there seems not to be too much information to be found in this area of research. Perhaps this can also lead to more understanding of the past, and the change in character of the weights as we get nearer to the Roman age, where most, if not all, weights were cone- or triangular-shaped rather than circular (Gleba and Mannering 2012, 168). Hence, the answers to this can lead to more research into more specialized areas.

Regarding the benefit to Archeon, I do believe it will help the workers to better understand the looms, and to explain better how it is made and what the function the weights have and what their shape and weight contribute to the finished weave. Also, depending on the outcome, it could also become something of an activity to do with the children who visit, since working with clay is relatively harmless but can still be enjoyable.
Performing the Experiment

The intended outcome of the experiment is to find which method gives the most even results. The methods to be are 1 - Using a re-useable mould, 2 – Copying a finished example, 3 – Cutting a uniform string of clay into certain sizes.

The first step of the experiment is to ensure there is suitable clay, tempered with sand if needed, as well as an oven to bake the weights and all other tools one would normally use for ceramic production. Care must be taken to ensure even firing for all versions of the weights, to reduce any irregularities that may occur. A finished weight (of ca. 400 grams) should of course be kept on hand to be used as reference, one for each type of production, made in the same manner. All methods should also account for any shrinkage that will occur during firing, the degree of which should be reduced due to the temper.

For each method, certain precautions should be taken to ensure all variables are as controlled as is possible.
Method 1 – The mould should be re-useable and not damaged, made from ceramic, or other suitable material, and prepared for each weight to ensure the clay does not get stuck to the mould and has to be gouged out.
Method 2 – The finished example can be fired, dry or still wet, but stick to just one of these, or attempt to make 15 of each following the example in each state.
Method 3 – Ensure the string of clay is as even as possible, and the unit of measurement should be a knotted string to get the lengths evenly cut. The reference weight should give the length needed for this.

Second step is of course, shaping the clay. Varying numbers of weights are needed for different weaves, thus for a narrow weave 15 weights should be sufficient (Mårtensson et al. 2009), making a total of 45 weights needed to be made. Using each method, and marking each weight with the number of order they are made in (first one is 1, second 2 and so on) and separating them by method. After the drying phase it is time for firing them. Preferably they should all be fired at the same time, but if that becomes impossible, divide the weights and fire them by method-batch. Use an appropriate way of ensuring even results.
Third and lastly, it is time for comparison. Using a scale, weigh the reference weight, followed by each weight in group 1, group 2 and group 3, separately. Note down any weight differences and compare them through the groups. If there is a large difference, more than 20-30 grams, attempt to establish the order in which they were made.

Especially for method 2, as one continues making the weights, there may be a tendency to be less precise with forming the latter weights, leading to more guesswork or estimation that it is now the right size. If there was more than one person involved in forming the weights, this can also lead to differences, thus using one person may be the best. But this could also lead to discrepancies due to guesswork as mentioned above, but using two may also lead to problems due to difference of opinions or technique.
Variables and Troubleshooting

In this experiment, there are a fair number of variables that are controllable, while some are not. The controllable ones are mainly regarding the clay uniformity and the methods of forming it, while uncontrollable variables may be regarding the firing, such as how hot the fire is, which can be dependent on wind and weather, especially if a closed oven is not used. Since the way the weights look besides shape and thickness does not impact the result, they can be fired in whatever way is easiest to control. Thus we reduce the amount of variables that we cannot control.

Of course, one variable that is always uncontrollable is the person who makes the weights. As mentioned above, two different people may have different approaches to the same task, and use different manners of finishing the task. As already stated, the ideal would be for one person to handle the entire experiment, but this also brings in fatigue, mood and hunger into the experiment for example. A person who is tired, or does not feel well, would attempt to hurry the process along by cutting corners or simply being less attentive. Thus my suggestion is to have one person forming the weights, while another controls that they are properly done, and if needed, decides to restart the batch or tell the other person to go on a break. This ensures even results, while still removing the chance of disagreement between two people both forming the weights of which one is correct.

Accidents may also happen, such as a mould breaking, or things falling and breaking. The fire may become unstable, or in worst case scenario, go out completely during firing. In the case of a major disruption, the entire experiment should of course be abandoned and re-done at a better time. Replacements for tools and parts may be needed, as long as these are ensured to be the same dimensions and materials as the originals.
Abstract

The goal of this paper is to devise and experiment for use in Archeon, in this case, using weights of a warp-weighted loom as idea. Many loom weights are found in archaeological deposits, in various shapes and weights. But not much is certain regarding how they were produced, using what techniques. Since the evenness of the weight is important to the quality of the resulting weave, it is important that all the weights are as evenly weighted as possible. Since they are made from ceramic, this may be difficult to ensure before firing, but using various methods, the result may be better. In our experiment we test three different methods. One, using a mould to shape the circular weights, two, using a finished example to copy, and three, cutting a uniform log or string of rolled clay into the same lengths and joining them into a circle. All the weights are marked in the order they are produced, so as to ensure that after firing and comparing, we can see at which point in the production, they started to become different or more even. Hopefully, this experiment will then lead to further research into the shape and materials of loom weights, and their production.
Bibliography
