

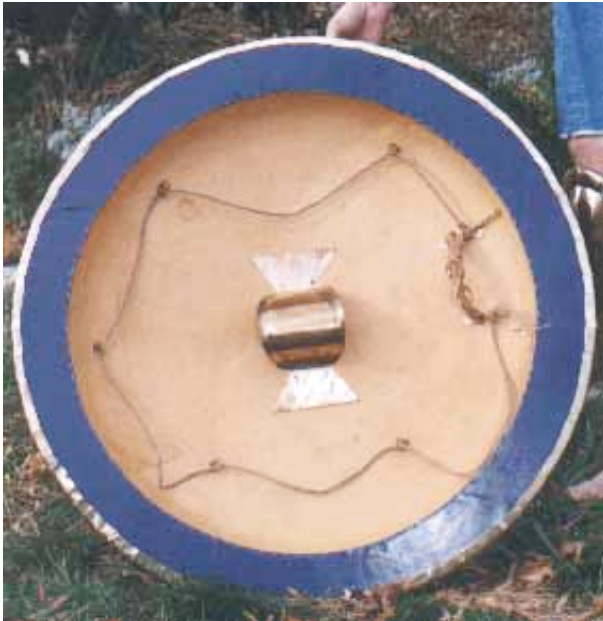
## THE ANCIENT GREEK HOPLITE

# HOPLON CONSTRUCTION

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Oddly enough, the shield we commonly refer to as the hoplon was called **aspis** by the Greeks. (We will continue to use the incorrect word on this site through force of bad habit-- just be aware of the truth and please take no offense at our error!) It was a deeply dished wooden shield with a flat or angled rim, a band for the arm (porpax) at center, and a handgrip (antilabe) near the edge. Earlier ones seem to have been covered with leather, with a thin bronze covering on the rim, but by the late Archaic period it was common to cover the entire front with a thin facing of bronze. One place to buy a hoplon is [Manning Imperial](#) in Australia (see [front page](#)). His is perfectly shaped and beautifully painted, though I don't know if there is any covering over the wood on the front, besides the paint. The wooden blank for a shield can be commissioned from Michael Broyles, [mjbroyles@yahoo.com](mailto:mjbroyles@yahoo.com), c. \$450 plus shipping. Any covering or fittings would be extra. There is also a fellow called Wulf in the UK, [wulf.lighting@virgin.net](mailto:wulf.lighting@virgin.net), or [sabre.wulf@virgin.net](mailto:sabre.wulf@virgin.net), though I don't know what sort of finishing he does nor what the cost might be. He made most of the shields shown on the [Hoplite Association](#) site. The old Deepeeka #AH3721 "Greek shield" is utter garbage, too small with ugly bolts around the rim, crappy fittings, and a great big Viking boss in the middle! Their new #6116 Athenian Shield may be usable (haven't seen a close report of it yet).



Peter Connolly's *Greece and Rome at War* has the most complete pictures and descriptions of any Greek equipment. According to him, the diameter of the hoplon varied from 32" to c.40", and the wood was 1/4" (5mm) thick in the middle. His drawing of the Vatican hoplon shows a maximum depth of c. 5"; the rim is c. 2" wide and 1" thick at the body, tapering to c. 1/2" at the edge. Some vase paintings show the rim as very thin and flat, with various depths and curvatures for the body. The Chigi Vase shows the backs of several shields, seemingly divided into rectangular and wedge-shaped segments, each of which is cross-hatched in a different direction. This may be showing layers of wood strips, similar to Roman scutum

construction.

In the newer Osprey Warrior Series volume #27, *Greek Hoplite 480-323 BC*, Nick Sekunda shows the wood core being composed of several wide slabs laid edge to edge and then hollowed and shaped by turning on a lathe, like a large bowl. (Peter Raftos of [The Phalanx](#) explains that the Greek word for "shield maker", *torneutoluraspidopêgos*, roughly translates as "one who puts together lyres and shields by turning".) Thin laths are then laid cross-grain around the rim. The back is covered by leather, fittings attached, then the bronze facing is stuck to the front with pitch and the edge neatly worked around the rim so that there are no pleats or puckers. Luckily, they "cheated" on this last part at least some of the time: on a shield facing in Piraeus the edge has been clipped into "tabs" about 2" wide, as I did on mine, so that they fold around the back much more easily. Then a flat ring of bronze was laid over the back of the rim to hide the tabs.

A word of caution: John Warry's *Warfare in the Classical World* shows a drawing of the inside of a hoplon on page 35. At its left edge is a strange detail which I believe is an attempt to show the layers of leather peeled back to reveal the wood underneath. It's not some sort of fixture!



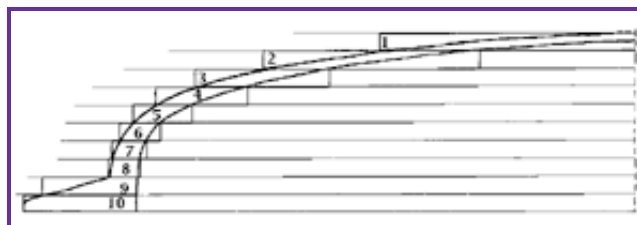
Front and back views of Jon Martin's hoplon. He dished the facing from a single sheet of copper (being unable to get bronze) and pieced the rim. The Greek letter lambda on the face was used by Spartans (Lakedaimonians) during the Peloponnesian War era.



This is George Marcinek's shield, by [Manning Imperial](#). The face is simply painted wood, without a leather or metal facing, but what a lovely paint job!

The construction method described here uses rings or donuts of plywood stacked and glued together, and was told to me by Toe Johnson in Australia. (Mike Kasner recommended solid planks instead of plywood, fearing that plywood will chip too much during the smoothing, but that proved not to be a problem.)

PLANNING--Drawing a full-size, half-width cross-section of the hoplon, as shown at right (click on it for a [larger image](#)). Remember that with your arm through the central arm band, the edge of the body should curve neatly over your shoulder. Draw it as if it is lying flat, face up. Draw a series of parallel horizontal lines through it, the intervals between them corresponding to the thickness of your plywood. For any particular layer, the point where the upper line crosses the inside of the cross-section determines the inner radius of that ring, and the point where the lower line touches the outside of the cross-section gives you the outer radius. Now you know exactly how big to make each layer!



The example above is my own shield's cross-section, 17" in radius and 5" deep, with the lines drawn to show how to cut it from half-inch plywood. Layer 1 is a solid circle with a 7-1/8" radius. The rest of the

approximate dimensions are here:

LAYER #	INNER RADIUS	OUTER RADIUS
1	solid	7-1/8"
2	4-3/8"	10-3/8"
3	8-1/2"	12-1/4"
4	10-7/8"	13-3/8"
5	12-3/8"	14"
6	13-1/4"	14-3/8"
7	13-5/8"	14-5/8"
8	13-7/8"	14-3/4"
9	14"	16-1/2"
10	14"	17"

In this example, it should be possible to cut these all from a single sheet of plywood, with some rings "nested" together. For instance, layer 1 can go inside 3 which can go inside 5, and 2 inside 4 inside 7. With a little fudging and careful cutting, 5 can go inside 10. One or two layers might have to be cut in sections, but that will not matter after assembly.

For 3/8" plywood, draw the lines 3/8" apart, and so on. I actually cut the two layers corresponding to 7 and 8 as a single layer of 1"-thick oak.

ASSEMBLY--For tracing the rings on the wood, make a "bar compass" by taping a nail to the end of a ruler (18" or longer) or similar flat piece of wood, etc., and clamping a pencil to the bar where needed. Mark the radius on the wood and adjust the compass to match. On each layer, it is a good idea to mark the outer radius of the next layer up (with a dashed line for clarity), so that the layers can be centered on each other properly.

Cut the rings out with a hand-held jigsaw or sabersaw. Obviously you'll have to drill starter holes to do the inside cuts, but keep them small and don't take "bites" out of your rings if possible.

Glue the rings together, being sure they are centered. You can add pegs for more strength. For ease of smoothing, don't glue the body to the rim yet.

SMOOTHING--Once the glue is dry, the fun begins: making the whole thing smooth, inside and out. For the outside, I used a drawknife near the edge, and a chisel closer to the middle, to remove as much obviously extraneous wood as possible. Be careful about the grain of the wood--hitting it at the wrong angle can rip up more than you want to remove. But I found that otherwise there was not much problem with big

holes needing puttying. Most of the rest I did with a rasp, which was hot and strenuous but faster than I had expected. Buy a nice big rasp and don't be timid with it. A belt sander is definitely a better option if you don't mind the noise and LOTS of dust. (I wasn't able to borrow one until I was mostly done.) It can be helpful to smooth out a strip c. 2" wide from edge to center as a guide and test area. The idea is to eliminate any trace of the steps, but not to go any deeper. Do a lot of eyeballing and run your hand CAREFULLY over the surface to find high spots.

That's Jon Martin's hoplon in progress at right, looking much like mine did at that point.



Since the drawknife and rasp don't reach the inside, I used the chisel and my drill with a rotary rasp (little spiked ball). The rotary rasp is a little less practical closer to the middle where the slope is very shallow, and it tends to skip over harder parts of the wood and chew into the softer bits. A 6" surform was some help near the middle, but not great. The belt sander was much better, and near the edge I used a very coarse sanding disc on my drill--both produced amazing amounts of dust. (The hand rasp and rotary rasp were both much neater, the dust being grainier and not flying everywhere.)

Most of this smoothing took about 2 weeks (starting right after Christmas so I had a little extra time now and then). It was a lot of work, but if I had waited for an easier way to do it, it would still not be done!

My hoplon is about 34-1/2" in total diameter, 28" across the inside bowl. The wood is about a quarter inch thick at the center and 3/4" where the bowl meets the rim. (This is just the opposite of a Roman or Celtic shield, which were often thicker in the center than at the edges.) The bowl is about 4-1/2" deep inside at the middle.

**COVERING**--Certainly a complete bronze facing is both the most desirable and the least obtainable. It should be quite thin, probably 22-ga, definitely not thicker than 20-ga. The best bet may be to send the finished wooden core--with internal fittings in place--to an armorer of proven ability, so he can fit the facing directly to it.

Fortunately, not every hoplon had a bronze facing. At least some were covered in leather and only had a bronze rim. The Australians simply give the wood core several coats of paint to hide the wood seams. My hoplon is covered in 4-5 ounce leather. I just used the rim to trace the circle I would need because it's a little bigger than the distance over the curve of the body. Wet the leather completely, stretch it over the body, and staple it in place. (Put the staples on the edge of the body that will be glued to the rim!) When the leather is dry, pull out the staples and trim the excess leather.

Before gluing the leather to the face, almost everything else has to be done! First, glue and peg the rim to the body. Then line the inside of the body with leather--deerhide works well. Glue the middle first, then work around section by section, gluing and using a sandbag for weight, to keep the leather smooth. Then cover the back of the rim with leather, too, with several pieces if necessary. Where the rim and body lining meet at the inside angle of the rim, the Vatican shield shows a line of running stitches, to keep the leather from peeling up. The lining can be painted or dyed--I painted the rim lining dark blue but left the body lining its natural golden color.

**FITTINGS**--The porpax (armband) and loops for the grip (antilabe) are cut from 18 gauge bronze, and

are secured with bronze nails bent over on the outside of the wood. I used bronze washers for the rings for the carrying cord, and secured them with split pins made from strips of 18-ga bronze, which pass through copper florets--the same as the brass ones I make for Roman armor. I cut little grooves in the front of the wood for the clenched nails and split pins to lie in, which helped a lot. Also, bend the tip of each nail over before bending it down flat, which sends the tip into the wood. Hold a sledgehammer behind the wood to absorb the impact of hammering. The rings for the carrying cord should be mounted so that the cord passes straight through them without having to make any sharp angles. The grip is made of twisted or braided leather thong. At this point you can actually pick up the hoplon and see how it fits over the shoulder. Neat, eh?

Right: one of the ring fittings through which the carrying cord runs, shown about full size.



I used 3 strands of heavy linen cord twisted together for the carrying cord. A little experimenting resulted in the right length for slinging the shield on my back with the cord going horizontally across my shoulders and chest. The shoulder still nests inside the rim to help support the weight. I had thought that the porpax would dig into my back, but it rests quite comfortably in the small of my back, and apparently even keeps the lower rim from bumping my legs.

Put Plastic Wood around the nails and split pins, just so that nothing sticks up too sharply from the face, and sand it smooth when dry.

NOW glue the facing on, similarly to the inside lining, starting at the center and then doing the outer section all at once, using a rope tied around where body meets rim to keep it tight until dry. If you want a leather rim, put that on, too. (Actually, since you'll want to stretch the leather over the edge, you may want to put it on before you put the leather on the back of the rim. My rim is brass, so I can't really help you!) Paint the front with an emblem or color scheme from a vase painting, etc. (I used the eye motif on a light blue background.) There is a terrific website showing dozens of emblems:  
[http://www.ritsumeai.ac.jp/se/~luv20009/Greek\\_shield\\_patterns\\_1.html](http://www.ritsumeai.ac.jp/se/~luv20009/Greek_shield_patterns_1.html) .

RIM--For a bronze/brass rim, you need to calculate the proper radius very carefully, remembering that since the rim is sloped you will essentially be making a slice of a very shallow cone. I tried to cut my rim from just 2 pieces, but made it an inch too large, so I had to cut it into pieces and trim the inner edges to fit. My finished rim is 5 pieces, overlapped and nailed. Moral: MEASURE, MEASURE, MEASURE!! And then MAKE PATTERNS!! Don't be afraid to spend several evenings just sitting and staring at pictures, parts, patterns, and measurements, it will save you much wailing and gnashing of teeth. I used .020" brass, which worked quite well. Anneal the part that will be folded over the edge, and add any etched or embossed decoration that you want (I went with etched triangles, effective and as complicated as I wanted

to get.) Knowing that I would not be able to avoid puckers in the brass at the back, I preferred to cut slits about an inch and a quarter apart to create overlapping tabs. This is actually how at least one surviving original was done, with a flat ring of bronze added to cover the tabs.

The finished weight of my hoplon is about 18 pounds, similar to Connolly's reconstruction. I have coated the brass rim with neatsfoot oil in an attempt to keep it from tarnishing, because it will be VERY difficult to polish!

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A more accurate alternative to the plywood donut method would be to glue some 2x4s and 2x6s together face-to-face to make a bloody great slab of wood, and work it into shape. With clever planning the pieces could be cut to rough shape beforehand, similarly to the donut method. If you happen to have access to (or can build) a wood lathe that will take a piece 3 feet in diameter, use it to turn the wood like a big shallow bowl. This is apparently how the ancients did it! (You could just do the dome that way, then add the rim.) It's possible the lathe was more like a potter's wheel, with the shield blank lying flat, which would be much easier to build. If you do the outside first, you might be able to shape your bronze facing over it, even spinning or lathing it to shape using the wood blank as the form. Then hollow out the inside.

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