

Basic Armouring for the New Fighter

Doug Strong

As new fighters, many people are faced with the question of how to acquire a set of armour. For a substantial number of people the solution is --"I'll make it myself." Unfortunately most people don't know where to start. In this article I would like to discuss three basic things: how to set up an armouring workshop, some philosophies that are helpful for new and old armourers alike, and some basic techniques for armouring.

Setting Up Your Workshop

Many people shy away from making armour themselves because they think it will be more expensive to buy all of the tools necessary to make a suit than it would be to buy the suit. But this is simply not true. While the tools can be expensive they don't have to be. I built my first suit of armour in the basement of my college dorm, with a ball peen hammer which I bought at a garage sale for \$1.00, a file (\$.50 at the same garage sale,) a drill I borrowed from my grandfather, a sabre saw I bought for \$20.00 at my local hardware store, and a piece of railroad track that I bought from a scrap yard for \$5.00. I spent \$28.00 on tools and borrowed a drill. I spent another \$15.00 on metal and \$5.00 on leather for straps. All told I spent \$38.00 on my first set of armour. All of the tools are still in working order a decade later and are being used today. All of the armour is still in working condition (although a few pieces have been outdated by changes in armour standards.)

In order to begin as an armourer you need a place to work, preferably with electricity, where you can make a mess and be loud. This is not always an easy place to find. Many of you who read this will, no doubt, be living in an apartment, townhouse or a dorm and will have nearby neighbors who may be disturbed by the noise and the mess you will make (I am the voice of experience on this subject as I began my armouring career in my dorm.)

Once you have chosen a workshop space you will need to begin to fill it with tools. Many of the tools that you will find will be free or nearly free. To start with you will need to begin haunting second hand shops of all descriptions, which include antique stores, second hand tool shops, flea markets, junk yards, white elephant shops, garage sales and the like. If you can find used tools the odds are high that you will get a better price than you would if you were to buy your tools new.

Figure 1 is a chart of tools that are necessary (or helpful) in armouring. They have been divided into eight categories: metal cutters, hole makers, anvils, metal finishers, dishing forms, hammers, stakes and vises. They have been further divided into three levels of sophistication. Those at the top of the list are the simplest and usually the cheapest. They are, however, often substantially less efficient. Those objects marked with "*" are useful even if you have more advanced forms of the tool. An ideal armouring shop would include such tools as: a drill, a sabre saw, some ball peen hammers, a steel bodied rawhide hammer, some files, a grinder, a tree stump, a center punch, a Beverly shear, a Roper Whitney punch, a bick horn, some cross peen hammers, some creasing stakes, some ball stakes, some dishing forms, an anvil, a leg vise, an orbital action jig saw, an oxy-acetylene welder, a forge, and an arc welder. Space considerations do not allow me to discuss the use and function of each of these tools but suffice it to say that if you get a good deal on any of them you probably should get it. I would however, like to discuss three of the more important and/or obscure tools: Dishing forms, ball stakes, and hammers.

Dishing forms can be anything that you can buy, make or find. The only requirements are that they are dished and hard. I personally have found four types of dishes. The first of these are blacksmith's swage blocks. These are large steel blocks with a variety of different shapes and depths of dishes in them. These can be very expensive. Oxy-acetylene welder tanks that are defunct can be used as dishing forms as well. Their bottoms are dished inward and you can often

get them cut off to a perfect height for working. Steel dishing forms can be found often at scrap metal yards. When thick plates have holes punched out of them they often have dished circles as scrap. (I make extensive use of this type of dishing form.) Finally, if you are unable to find any of these types of dishes then you can carve one into a wooden stump.

Ball stakes are extremely useful for raising, planishing and forming. Any steel ball you can find can be made into a ball stake. Take it to a machine shop and have it welded to a heavy piece of bar stock. The more sizes that you have of these the better off you will be. You can also have a machine shop cut a ball in half and have it welded to a piece of bar stock so that the sharp edge is facing up. This will give you a very nice creasing stake.

Hammers come in a variety of shapes and sizes. All of them are useful, either in their original form or reshaped with a grinder. A broad faced dishing hammer can be made by grinding any large hammer into a broadly faced ball. One of the most useful hammers is a steel bodied rawhide faced hammer. Grind the face slightly so

Metal cutters	Hole makers	Anvils	Metal finishers
Cold chisel*	Center punch*	Hunk-o-metal	File*
Sabre saw*	Drill*	Railroad track	Grinder*
Beverly shear*	Roper Whitney punch*	Anvil*	Grinder with buffing wheel*
Dishing forms	Hammers	Stakes	Vises
Sand bag	Ball peens*	Trailer hitch	Pliers*
Wooden stump	Steel bodied rawhide*	Ball stakes*	Vise*
Steel forms	Cross peens*	Creasing stakes*	Leg vise*

Figure 1. The tools you need.

that it is rounded and do your primary passes of dishing with this. It will not put any major dimples in your metal pieces.

Figure 2 is the result of a survey of nearly 100 armourers. I asked them "what tools are absolutely necessary in order to make armour?" The answers I received were quite diverse but they were able to be boiled down into this **Top Ten Armouring Tool List**, as each of these tools appeared time and time again in each of their lists.

The Armourer's Top Ten List of Basic Tools

1. Drill
2. Saber saw
3. Ball peen hammer
4. Railroad track

5. Steel bodied rawhide hammer
6. File
7. Grinder
8. Stump
9. Center punch
10. Vise

Homilies from armourers on tools:

"Never pay full price for a ball peen hammer."

"The only tool you need is a welding torch. You can make everything else you need with it."

"You can never have too many tools."

"Tools are forever."

"Anything can be made into [or used as] a tool."

Philosophies and Tips from an Armourer

Once you have your tools, the next step is to design your suit of armour. I highly recommend that you try to create a suit of armour that is homogenous in its period and nationality, historically accurate, light weight, highly flexible, and simple to build. This may sound like an impossible task but it is possible to make good looking inexpensive armour that works well on your first try. The key is to choose your armour well. Do not expect to be able to make a suit of fluted gothic plate armour on your first try. This is unrealistic.

You might however, be able to make a simple suit of mid-fourteenth century armour with a little time and care in picking and choosing the elements that you wish to incorporate into your suit. The best advice I can give you is to get some books on medieval armour (see bibliography) and try to copy the things you see in them.

In my opinion the most practical period of armour for SCA combat is the fourteenth century. This century was the period in which armour changed from largely mail to largely plate. It was a time of great experimentation with pieces and styles of armour. An authentic, flexible, lightweight and reasonably inexpensive suit of armour can be made by copying examples from this period. A nice fourteenth century suit might include a gambeson, a barrel helm, a coat of plates, a gorget, hourglass half gauntlets, elbows attached by leather to a vambrace, and knees attached by leather to cuisses. All of these pieces are easy to build and look good.

Homilies from armourers on philosophy:

"Don't look at the way SCA armourers are making pieces. Look at the way real armourers made the originals."

"Read, read, read, read, read. . . !"

"Don't be afraid to ask other armourers why they are doing something the way they are doing it."

"Acquire all the books on armour you can. There is no such thing as a useless armour book."

"Look at real armour"

"Go see real armour."

"Make real armour!"

Techniques of Armouring

In this section I will discuss basic techniques for an armourer. These techniques will be used in a variety of different operations. I will discuss dishing, planishing, rolling edges, creasing, riveting, articulation, and polishing as well as providing a number of other helpful hints.

In order to dish a piece of metal it is important to have the correct shape and size of dishing forms. Place the piece over a shallow dishing form and begin to hammer the piece with a steel bodied rawhide hammer. Work from the outside in toward the center. When the piece conforms to the dimensions of your shallow dish, place it over an intermediate dish and repeat the process. (For an intermediate dish I recommend using the bottom of a defunct oxygen tank.) Once you have taken the plate to the depth of your intermediate dish it is time to place the piece over your deep dish. Hammer the piece with a broad ball faced hammer (broader than a ball peen). Hammer it until it conforms to the depth and shape of your dish. If you wish to speed this process up then try working the metal hot. Use either a forge or an oxy-acetylene torch to heat the metal to a glowing red heat. This will make the dishing go much faster! (do not use this technique with a wooden dishing form!)

When your piece is dished you will want to planish the piece. Planishing is the act of removing dents, hammer marks, and inconsistencies with a hammer. In order to do this, place your plate upside down on top of an appropriately sized ball stake and hammer lightly with the most finely polished, flat-faced hammer you have. Remember, any marks in the face of the hammer will be transferred to the surface of the metal each time you strike it, so be sure your hammer face is clean and free from dings. Strike the plate only where it is resting on the ball stake. Moving the plate evenly across the ball, hammer until you have made one complete pass of the surface. You may wish to make more than one light pass of the piece. Any small planishing marks that are left on the piece will be removed in the polishing stage. You may also wish to use the ball stake in order to form your plate so that it has the desired shape.

In order to make the edge of a piece stronger you may wish to fold it over. In order to fold an edge you will need to draw a line 1/4 of an inch in from the edge you wish to roll. Place the plate against a sharp edge of your anvil (or bick horn or railroad track etc.) so that the line you drew is even with the surface and only the 1/4 inch edge sticks up above the surface of the anvil. Hammer the piece lightly until it begins to fold down towards the surface of your anvil. Take several courses of hammering in order to make it reach the surface of the anvil. Don't try to do too much in one pass or you will create ripples and cracks in the metal. When the plate has been hammered until it is at 90 degrees place it on the surface of the anvil so that the 1/4 inch edge is sticking up once again. Hammer this piece lightly until it is folded down into place. Once again remember not to do too much in one course of hammering.

You may also wish to wire an edge to strengthen it as well as give it a more finished appearance. In order to wire an edge you will use a very similar process to the one just described. The difference is that once the piece is at a 90 degree angle you will place a small piece of wire in the crook of the "L" you have just made. Proceed as you would for folding the edge until the wire is trapped.

In order to crease a piece draw a line on the outside of the piece. If you are unsure of your ability to make an accurate crease you may want to start the crease from the inside using a blunt

chisel with a rounded cross section. In order to do this you will need to mark the line on the inside of the piece as well. Place the plate on a lead block with its line down. Place the chisel so that its face runs parallel to the line and strike it lightly. This will leave a small indentation in the metal. Move the chisel slightly along the line and make another mark. This mark should butt up against or overlap the previous mark. If it doesn't, go back and make another mark that fills the gap. Move all of the way along the center line until you reach the other edge of the plate. Once this has been done go back and clean up any irregularities with the chisel. When you are doing this step you will need to be careful that your chisel is absolutely parallel to the line. When you have your starter crease made, turn the plate over and examine it from the outside. If the piece doesn't look perfect turn it back over and fix the imperfections. When the piece looks correct take it and place it on a half ball creasing stake. Use the edge of the ball to find the starter crease. You will feel it catch in the crease. Hammer the plate lightly where the ball meets the piece. Allow your hammer face to overlap the edge of the crease slightly. This is a delicate operation. Be sure that you are not hitting the metal too hard. If you hit the metal with too much force you are in danger of cracking through the crease. Proceed with this operation slowly and carefully. Remember: always strike where the metal is supported by the ball, never strike from the cut away side. When you have made one pass of hammering from each side of the crease on the half ball stake, you are ready to take the final pair of passes on the creasing stake. This pass is done in precisely the same manner as the previous pass except you will need to be even more careful and accurate with your hammer blows.

In order to articulate an arm or leg harness you will need to bend your lames so that they exactly conform to the shape of the cop to which they will be joined. It may help for them to be dished slightly. Make holes approximately 1/3 of an inch in from the edge of each corner on the cop (not on the lames.) Place the lame into the cop in the position that it will be in when the leg or arm is opened as far as it will go and mark the position of the holes you made onto the cop by pushing through the hole anything pointy, such as a magic marker, a pencil, or a scratch awl. Place the lame inside the cop as it will rest when the leg or arm is fully closed and mark the holes. Be careful not to let the lame move from side to side while you are marking these. You should now have two pairs of holes which are running more or less parallel to one another. Find the center points between the two marks and make your articulation holes at these points. These holes should be slightly larger than the rivets you are using. Bolt the pieces together and check the articulation. If for some reason they don't work quite right try loosening or tightening the bolts. If all else fails try this process again and make some new holes.

The reason you use bolts is so that you can take them out and polish all of the pieces. In order to polish the armour you have two options. The first of these is to sand the pieces by hand, using various grits of sand paper to achieve the desired finish. The other option is to use a buffing wheel. This is the better choice. If you have a grinder simply remove its stone wheel and put on a cloth buffing wheel. Coat the cloth wheel in a buffing compound. I use an 80 grit greaseless compound available from my local abrasive company. It is at this time that every mistake you made in the hammer work process will come back to haunt you. Remember, every hammer mark you put in is one more hammer mark you have to take out!

The final stage of any project is riveting it together. In order to join two pieces, place the rivet through the hole and rest its face against the anvil. Begin to strike the edge of the rivet with the ball end of a ball peen hammer. Work your way around the edge in a circular fashion until the rivet mushrooms out slightly. If you are articulating you will only need to make the shaft of the rivet big enough so that it cannot fit through the hole. However, when you are riveting normally you will want to be sure that the edge of the rivet touches the surface of the metal.

Some other helpful hints include remembering that different parts of a suit of armour will use different thicknesses of metal. Helmets might use 12 or 14 gauge. Elbow or knee cops might use 14 or 16 gauge. Breastplates might be made from 16 gauge. The cuisse of a leg harness might use 14 gauge while the lames and demi-greave might be made from 16 gauge. Arm harnesses

except the cop and gauntlets are commonly made from 18 gauge. I suggest that you drill holes at the inside corners of plates before you cut them out. This will prevent cracking at the corners. Don't forget to file all of the edges of your pieces. Do this by taking a file and smoothing out any irregularities on the edges of the plates. This will save your hands from many small cuts while you are constructing the piece and improve the overall look of the finished product.

Homilies from armourers on technique

"If at first you don't succeed, get a bigger hammer!"

"Improvise!"

"Don't polish the piece until you are done hammering on it."

"Always file your edges."

"Finish is as important to the overall look of armour as form."

"A nice surcoat covers a world of ugly."

Bibliography

Blair, Claude. European Armour. London: B.T. Bastford Ltd., 1958.

Dufty, A.R. European Armour in the Tower of London. London: Her Majesty's Stationery Office, 1968.

Edge, David. and John Miles Paddock. Arms and Armour of the Medieval Knight: an Illustrated History of Weaponry in the Middle Ages. New York: Crescent Books, 1988.

Ffoulkes, Charles. The Armourer and His Craft: From the XIth to the XVIth Century. New York: Dover, 1988.

Norman, Vesey. Arms and Armour. London: Octopus, 1972.