

Chain mail

Introduction and history

Chain mail is the result of interlocking rings or links together to make armor or jewelry. Chain mail is more properly called just mail, as the word “mail” is defined as armor made with links of chain. It has several advantages as armor. It is flexible. It was effective against both slashing weapons and arrows. It expanded and contracted readily, and did not need to be closely fitted, so could be used by many people of the same general size. It is comparatively simple to make, and it could be made piecemeal – the maker could make small parts of the armor as metal became available. These advantages more than made up for mail’s disadvantage of being relatively less protection against mass (blunt) weapons.

No one knows for certain when the first mail was made. There is some archeological evidence to suggest that the Celts of the third to fourth Century BC made and used mail. Some scholars point to the Scythians as the inventors of mail, and there are some other, really speculative theories as to the origins of mail.

Regardless of the actual origin, we do know that the Romans made and used mail as early as the second Century BC. The Romans called this armor *Lorica Hamata*, and it was the standard armor in Rome until it was replaced by *Lorica Segmentata*, the semi-plate armor we think of when we think of Roman armor. Even when *Lorica Segmentata* was the standard armor, *Lorica Hamata* was still used by lower ranking soldiers, and auxiliaries throughout the Roman Republic & Imperial periods.

Undoubtedly the ‘glory days’ of mail armor were the 12th through the 16th Centuries AD in Europe. According to Fiamma in the “Chronicon Extravagans” in 1288, in just the town of Milan, there were more than one hundred chain mail makers that specialized in making only hauberks (shirts). In 1295, Fredric the Lombard, a merchant-armorers, assembled 4,511 mail shirts in Bruges for Phillip the Fair’s fleet. By 1363, Nuremburg and other towns had guilds devoted to mail, with four to fourteen-year apprenticeships and quality control inspections by the guild masters. Mail also had a medieval ‘seal-of-approval’ – mail makers stamped the town arms on one or more rings of the quality mail. This practice was repeated in other parts of Germany, France & England.

Mail started out being armor only for the rich, as it was expensive and time-consuming to produce. As time went by, and more smiths began producing it, mail began to be used by larger segments of the fighting classes; by 1586 it was a normal part of the common soldier’s equipment, and by 1618, it was commonly found on arquebussiers. Mail was said to be “of proof” if an arrow could not pierce it. However, as time went by, and weapons technology improved, mail became less and less protective relative to the weapons it faced, so it was relegated to lower class fighters, and as a supplement to plate

armor, in places where flexibility was most important. Just before the widespread use of gunpowder made all armor obsolete, the “Chronicle of Gerald de Barri” illustrated how far bow technology had advanced. It tells of a longbow arrow that goes through three thicknesses of mail and a padded gambeson before pinning the wearer’s leg to his saddle.

Mail was also made and used outside of Europe. In about AD 1000, armorers in Japan started making mail. This Oriental mail looked much different from European mail. Instead of being flat and used as whole-body protection, mail from the East had rings that stood perpendicular from the body and was used to connect different pieces of plate armor together. Mail was in common use in Japan until the 17th Century. Mail was also used in parts of Africa, the Middle East and India until the 19th or 20th Century.

Types of Chain Mail

Each piece of mail had a special name. Mail that forms a cap or helmet is called a coif. The mail that protected the torso is called a habergeon, hauberk or byrnie. Some modern authorities make the distinctions that a hauberk goes to the knees and has sleeves, a habergeon stops at the mid-thigh and a byrnie is sleeveless and stops at the waist, but these distinctions were not always followed in period writings. An extension to a hauberk that protects the lower arms and often extends to mail ‘mittens’ is called a muffler. Mail that protects the legs and feet is called chausses (pronounced SHOWS). Mail that hangs down from a helmet and protects the neck and shoulders is called either a camail or an aventail. A ventail is a flap of mail that protects the mouth and cheeks. The ventail is usually attached to a coif with a strip of leather and is laced on the opposite side of the coif. Finally, a piece of mail that drapes around the shoulders and has a hole for the head is called a mantle or bishop’s collar.

There are four different ways to make the closed links that make the mail. Links can be stamped or cut from a solid sheet of metal and then don’t need to be closed. Links can be cut from wire and then welded closed. Links can be cut from wire and then riveted closed. Finally, links can be cut from wire and then the ends of the wire butted together without any mechanical closing. Examples of period mail still exist that use each of the first three closure methods, but there aren’t any surviving examples of Medieval mail that where the links are just butted together. If butted links were used in the period, they were at most used only for field repairs until the mail could be brought to the shop for a more permanent repair.

Making Chain Mail in the Middle Ages

No one is sure exactly how mail was made in medieval times, because there are no contemporary technical documents about producing mail. This is not surprising, as this knowledge would be considered a trade secret. What we do know comes from three sources: historical documents about mail in general, woodcuts (especially burial effigies of people in mail and industrial scenes of mail makers at work) and surviving artifacts.

We think this is the process that medieval mail makers used to make mail: First, the iron was drawn into wire, and then it was wrapped around a mandrel to make a coil of links. The links were then cut from the coil with a chisel or wire cutters, and the individual links were resized around a smaller mandrel to produce links with an overlap. The mail maker then flattened the overlap, or even the whole ring, in preparation for drilling a rivet hole. Once the hole was drilled and the link added to the armor, a rivet was inserted and closed, forever attaching the link to the armor. As the metal hardened during working, the mail maker might have to anneal the mail (heated and slowly cooled it) to make it easier to work. The tools used to make mail would be those found in a blacksmith's shop, although in period these were two distinct specializations.

Making Chain Mail in the Current Middle Ages

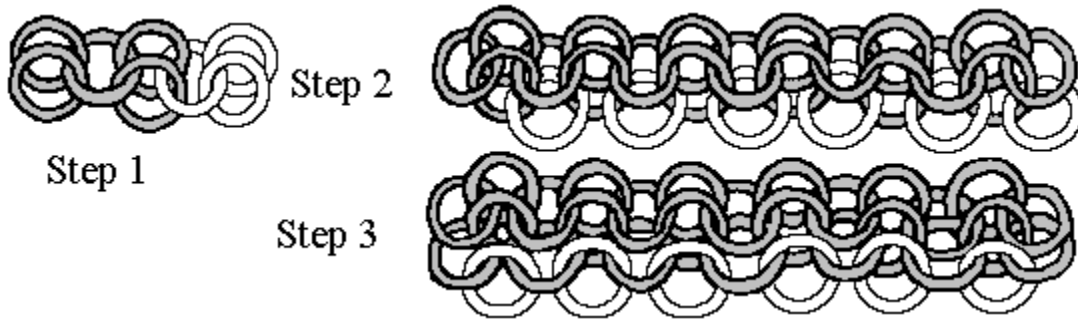
Because riveted mail requires more equipment and more fabrication steps to make, most modern mail is made from butted links. A person can start making butted mail with a financial investment of between \$5 and \$25 for tools, depending on how many tools that person already has. Wire can be equally inexpensive; many mail makers started by using wire coat hangers, which are practically free! At a minimum, the mail maker needs a mandrel, a cutting tool, two pairs of pliers and a supply of coat hangers.

The mandrel is used to form the wire into a coil of links, like a spring. Most mail makers bend their mandrels into a crank shape, and drill a hole in the body of the crank. This hole is used to hold the wire in place while the links are formed around the mandrel. The crank is often placed in a frame to steady it. The frame could be nothing more than four pieces of wood nailed together into a topless, bottomless box. Two holes are drilled in opposite sides of the box to hold the mandrel and the top edge of the box is used to steady the wire. With this arrangement, the mail maker uses one hand to turn the crank, while the other hand guides and steadies the wire. Serious mail makers might construct a motorized winding rig; they can find plans for such a rig on the internet, but links can be made without such elaborate equipment.

After the wire is made into a spring, the next step is to cut the links. Cutting tools go by several names: compound cutters, nippers, dykes, snips, shears, Dremmel cutters and jeweler's slot saws, just to name a few. Which cutting tool a mail maker uses to cut links is a personal preference – if you can, try out other people's tools before deciding on your own. Usually (but not always), tools that make smoother or more precise cuts are more expensive. Regardless of the tool, the end result is a pile of cut links, with one end of the link offset from the other end by one diameter of the wire.

Once the links are cut, the construction can begin. Start by closing several links. Make a chain of closed links, alternating single and doubled links, as in the picture marked Step 1. Extend this chain to the desired length. Then, as in the Step 2 picture, take an open link (in white) and connect two adjacent links of the chain together. Repeat

this procedure, adding rows (as in the Step 3 picture). This will give you a sheet of flat mail,



Glossary:

4-in-1 – the most common mail pattern, each link interlocks with four others.

6-in-1 – an uncommon mail pattern, each link interlocks with six others.

Butted mail – mail where the ends of the links are not fastened together, merely placed close enough together that a link cannot pass through the gap.

Chain mail – see mail

Chausses – mail that covered the legs and feet

Coif – Mail that covers the head and neck (and sometimes the shoulders)

Hauberk – a mail shirt (also called a habergeon or byrnie)

King mail – an uncommon mail pattern, a 4-in-1 pattern with every link doubled.

Link – a small ring used to make mail

Mail – Armor or jewelry made from interlocked metal links or rings

Mandrel – a round rod used to form links of mail

Riveted mail – mail where the ends of the links are fastened together, either by welding or by riveting. It is stronger than butted mail

Resources

Webpages:

<http://www.maileartisans.org/> - Wonderful site! Claims over 400 patterns (But I think there are some patterns counted twice) and a large collection of How-to and Techniques articles.

<http://how.to/chainmail> - has the best explanation of expanded coif construction that I have found, but hard to navigate the site

<http://www.derakon.chainmailstore.com/> - has some of the best graphics I've ever seen, also good how-to articles. The links section is also great.

<http://homepage.ntlworld.com/trevor.barker/farisles/guilds/armour/mail.htm#sect5>
(Butted Mail: A Mailmaker's Guide 4th Edition) best overview of all aspects of mail.

<http://www.armorarchive.org/> The Armoring Essays and Pattern Archive discuss mail topics, but they are mixed in with other stuff.

<http://www.bladeturner.com/pattern/hauberk/hauberk.html> - a good hauberk pattern

Books

Art of Mail Armor: How to Make Your Own by Brian Price - Paladin Press (March, 2002) ISBN: 1581603061

The Armourer and His Craft: From the XIth to the XVIth Century by Charles Ffoulkes – Beaufort Books (June 1, 1967) ISBN: 040508501X

The Art of Making Armour: A Craftsman's Guide to Creating Authentic Armour Reproductions by Rob Valentine - American Literary Press (February 1, 2000) ISBN: 156167527X

Techniques Of Medieval Armour Reproduction: The 14th Century by Brian R. Price – Paladin Press (September 1, 2000) ISBN: 1581600984

Sources of supply:

Mandrels – Your local Hardware superstore (Home Depot / Lowe's) Look for iron rod in 3-foot lengths. about \$3 each

Wire – Every Ace Hardware that I'd looked in (and that's a lot of places) carries 14- & 16-gauge galvanized wire in 100 -200 foot coils for \$3-\$8 / coil. They also carry mail-gauge brass wire in 25-foot coils. The down side is that pound for pound, it's expensive at Ace; for large lots (¼ mile, ½ mile or larger spools) mail order is the way to go.

Tools – Hardware superstore or Sears. Pliers cost \$2 - \$8 and cutters cost \$5 - \$25.