

## Armour penetration - Welsh warbow verses armour

War arrowheads were designed to defeat the predominant armour of the time and an arms race between missile and armour inevitably ensued. Initially only the knight's head was protected by plate metal in the early medieval period. Needle bodkin arrowheads easily overcame even the best riveted maille and increased ratio of plate armour. By the start of the 'Hundred Years War' a great proportion of the knights body was encased in it and this continued to increase until the Tudor period.



(Above) Arrowheads like this were used for hunting and warfare in the earlier medieval period and could defeat maille. This one dates from the 1100s, probably in the reign of King Stephen.

(below) A 14th C maille shirt made from riveted iron rings. Since the Norman Conquest, a gambeson (a type of layered or padded fabric armour) and maille shirt, or habergeon protected the body. This was worn with a nasal helm and kite shield. Poorer soldiers would just wear the gambeson on their bodies which could be surprisingly effective against both arrow and edged weapons. Small amounts of plate armour augmented the maille/gambeson by the military elite in the late 13th century. A good example of this is depicted in a tomb effigy at Pershore Abbey.



Modern testing by Mike Loades using type 10 bodkins shot from heavy warbows against a linen/deer skin gambeson had a similar effect to the event described below.

*The king approached the bounds of Powys, and maredudd sent young men to way-lay the king, to a certain counter slope the way along which he was coming, in order to engage him with bows and arrows and cause confusion among his host with missiles. And it chanced that the king came that way at the time when those young men had gone to the counter slope. And those young men met the king and his men; and with great tumult and shouting they sent missiles and*

*Keen arrows amongst the host. And after some had been slain and others had been wounded, one of the young men drew his bow and discharged an arrow amongst the host; and without his knowing where it was going, it went right through the host until it reached the king ; but because of the armour and corselet that were about him it did him no harm, but the arrow recoiled. And the king had a great fright, exactly as though the arrow had gone through him.*

1121 a.d

( brut y tywysogion)

Peniarth ms.20 .145b. 12-145b. 22

The modern test arrows may have penetrated the gambeson if needle bodkins were used but the King wore maille over the top. One can assume that both the maille and gambeson were of the highest quality.

### **Plate penetration, Fact or Fiction?**

An ongoing and acrimonious debate usually ensues within military archery when the ability of arrows to penetrate plate armour arises. Seemingly the effectiveness of the military longbow is episodically built-up and subsequently denigrated. Indeed, a recent television programme attributed Henry V's victory at Agincourt to little more than a crowd control incident waiting to happen.

Many even question whether arrow penetration through plate is a relevant question anyway. The case is made that the hydrostatic shock, resulting from an arrow strike, can traumatize soft tissue even if armour penetration does not occur. It is also rightly argued

that the percentage of a medieval army actually protected by plate armour (including horse) makes it a moot point.

Nevertheless, the answer as to whether Welsh medieval archers could shoot an arrow through plate is not simple to answer. Certainly plate was of various thicknesses in different places on the body. Armour, of all types, must always balance protection with encumbrance. For instance, greaves (lower leg armour) usually are less than 1/16" in thickness and helms often well over double at its thickest parts. Typically the side and back of a man-at-arm's armour was thinner and, therefore, weaker. Medieval chronicler, Jean Froissart (1337– 1405) wrote that Anglo-Welsh archers, who were arrayed on the wings of an army as at the Battle of Poitiers and were even more effective as they shot into the sides of the enemy.

Another huge variable was the quality of the design and manufacture of the plate armour. The finest Milanese and gothic armour offered unparalleled protection but only at a very handsome price, perhaps akin to a buying a Ferrari nowadays. Also like a Ferrari, a finest bespoke white harness was not a common sight and out of reach to the vast majority of soldiery. The polished, curved and hardened surfaces were not replicated on munitions grade armour and, in all likelihood, could be defeated by a powerful shot. It should be noted that wearing fine armour usually gave protection from death in another form as it would be clear that the wearer was well worth keeping alive and ransoming. It would be a sum that would set an archer up for life.

### **The plate-cutting head**

Many later medieval and Tudor war arrowheads had a composite steel/iron construction with the former manifesting itself as the hardened outer cutting layer. This could be achieved by case hardening the metal. The heads were heated to a bright cherry red whilst immersed in a high carbon material, such as charcoal or powdered bone and left to cool slowly. The outer surface of the arrowhead absorbs the carbon to produce a steel coating over a softer iron core. The head was then reheated and quenched in water (or in that medieval panacea for all evils, urine!) for further hardening. Such a process is capable of producing a head with hardness capable of scratching glass yet without being so brittle the head shatters. A hard arrow point allows an arrow to gall the plate armour to gain purchase on the otherwise deflecting curves. Medieval requisitions state the requirement for 'well steeled' arrowhead. A 1405 statute proscribed that arrowheads were to have steel points and bear the mark of the maker, presumably to make arrowsmiths accountable for the quality of their ware.



This beautiful head is a crossbow quarrel from St Briavels in the Royal Forest of Dean, once part of Wales. St Briavels was an important 13th century arrowhead and quarrel producing area, having both the timber for charcoal, iron ore and rivers for transport close at hand. John de Malemont oversaw thousands and thousands of heads produced. Heads were often classified as for one or two footed crossbows. This being a reference to the force and

technique needed to span the prods. It is thought that this type of head was adopted for use with the heavy longbow as plate became more prevalent.

### Test rig shooting

Examples of 15th century cuirasses (upper breast plate) in the splendid Wallace collection show this frontal thickness of metal as being, broadly representatively, the stoutest part. An average dimension for these is approximately 2mm. Therefore a 14 gauge plate of mild steel (0.0747 inches or 1.625mm thick) was rolled to construct a simplified cuirass. The hardness of mild steel is around the same as the breast plates found on the Mary Rose but thinner than the frontal section which were closer to 1/8".



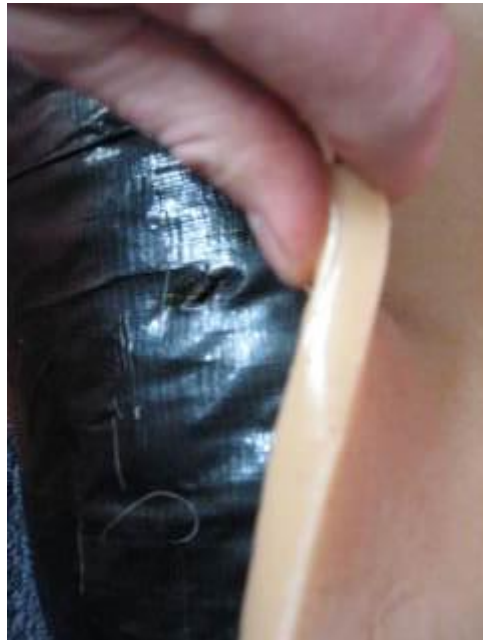
(Above) Modern mild steel, in this case 14 gauge, is very homogenous and metallurgical constant. This is not at all like medieval iron that had impurities with soft and hard areas in the same plate.

(Below) The construction was quilted to keep the layers in place.



This plate was placed over a similarly simplified akerton. The akerton, a short jack like garment, was worn by a man-at-arms under his plate to absorb some blunt trauma and prevent chafing as well as providing additional protection. This was constructed from ten layers of robust linen cloth.

Beneath this was ½” of ballistic gel that was constructed to have the same penetrative properties as human flesh. Finally the whole assembly was mounted on a sack of pulses.



It should be noted that Welsh archers usually fought a defensive action and the foe would be advancing when they received the arrowstorm. This increases the effectiveness of the arrow as less energy is wasted knocking the target back. To this end the target was braced by an 8” backplate of timber.

The archers managed to penetrate the plate and linen akerton by shooting hardened plate-cutting quarrel type bodkins from heavy bows at about 20 yards, the distance the last shot could effectively be taken in a battle. The arrowheads were glued onto the shafts as this allows more energy to be transferred to the target and not wasted by deforming the arrowhead socket.



The top two case-hardened quarrel type plate cutting arrowheads were used for the test. The heads are sharp and hard enough to start the penetration whilst the cutting edges roll back the plate to allow a deeper breach into the plate. For contrast a needle bodkin (bottom) is shown and its delicacy by comparison is apparent. This type of head passes through maille, seemingly as easily as morning mist, it crumples like a Turkish slipper against plate armour of any thickness. Whilst this test is limited in its accuracy due to the use of modern materials it may be analogous to a warbow/military arrow being shot at close range and striking the thinner sections of a harness, such as the sides of the breast plate, visor and maille only covered parts.



The arrow is replaced to show the potentially lethal depth of penetration.