



Notes to making a replica of the Mary Rose bow 81A3940

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- Initial stave of high altitude Italian yew. There are no knots on the back, just a few pins. The heartwood has ca. 30 rpi, while the sapwood twice as much ca. 60 rpi. The stave has one half naturally in reflex and one half in deflex.



- Scraping carefully the bark and cambium layer.



- The stave with the bark removed. Traces of cambium are still visible. They will be removed later.



- A rough shape of a bow drawn on the stave.

- The rough shape cut using a bandsaw. At this stage the stave is a little longer than the final bow, ca. 202cm.



- The stave is shaped with hand tools to the required dimensions plus a reserve of a few tenths of a millimeter. The final bow should be 37.6mm wide and 34.5mm deep in the middle.
- Straightening the stave using dry heat. At this stage I keep its cross section rectangular.



- The straightened stave. It took a lot of time and effort to make the stave such straight. Many heating operations were needed. It is also necessary to let a stave set up for at least a week or two and repeat the straightening again and again until it remains straight.



- Scraping the sapwood. It was 5-6mm thick, so there was no need to make it thinner. Small pin knots are left raised.

- The stake with finished back. Edges are yet slightly rounded for a deep D cross section.



- Shaping the belly of the bow. The bow is required to have a deep D section. The stave was very clean, only few knots in the belly was necessary to left raised (to avoid frets).



- For strong yew bows I prefer to use temporary horn overlays, because the wood itself is soft and a string may destroy or split self nocks easily.

- After shaping, the bow is straightened again...



- The straightened and finally shaped bow with horn overlays ready for tillering. It had been cut exactly to the required total length 2006mm.



- The first bending on a tiller. The bow is very inflexible and strong. A finished bow of this strength would be a well over 150lb 30". It bends more in the middle, but it is ok, because I left the tips stronger to avoid unwanted "whip-ended" tiller. The tips are at this stage still ca. 16mm thick.



- The bow has been tillered with a lose string to ca. 26" and is braced for the first time. The stave returned partially to its initial shape - the right limb is a little deflexed just above the centre and below the tip.

- Failure of the tillering string. The string, made of 24 strands of fast flight plus, broke during tillering. Fortunately at brace. If the bow was drawn, it would have been broken in many pieces. Probably, the string was worn out.



- The bow tillered to 28". The outer limbs are still a bit stiff. The draw weight was measured at 128lb 28".

- The shape of the bow just after tillering. View from the upper and the lower limb respectively. The bow took a slight set in the places where the natural deflex was present in the stave.



- Drilled buffalo horns. Buffalo horns are much tougher than cow horns and do not split so easily.



- Marking the inside of the horn tip with a pencil helps to ensure a tight fit. There must be no gaps.



- The horn tip glued on.



- A rough shape of the horn tip without string grooves. I make typically two front grooves - one extra for a stringer. On the Mary Rose bows side nocks were used, but the customer wanted this style of tips.



- Fully tillered bow at brace. During tillering the dimensions were adjusted. The bow is 1976mm long nock to nock and 37.8x34.7mm in the middle, hence, it is by 0.2mm thicker and wider than the original one.



- The bow at full draw 30". The final draw weight is 130lb.



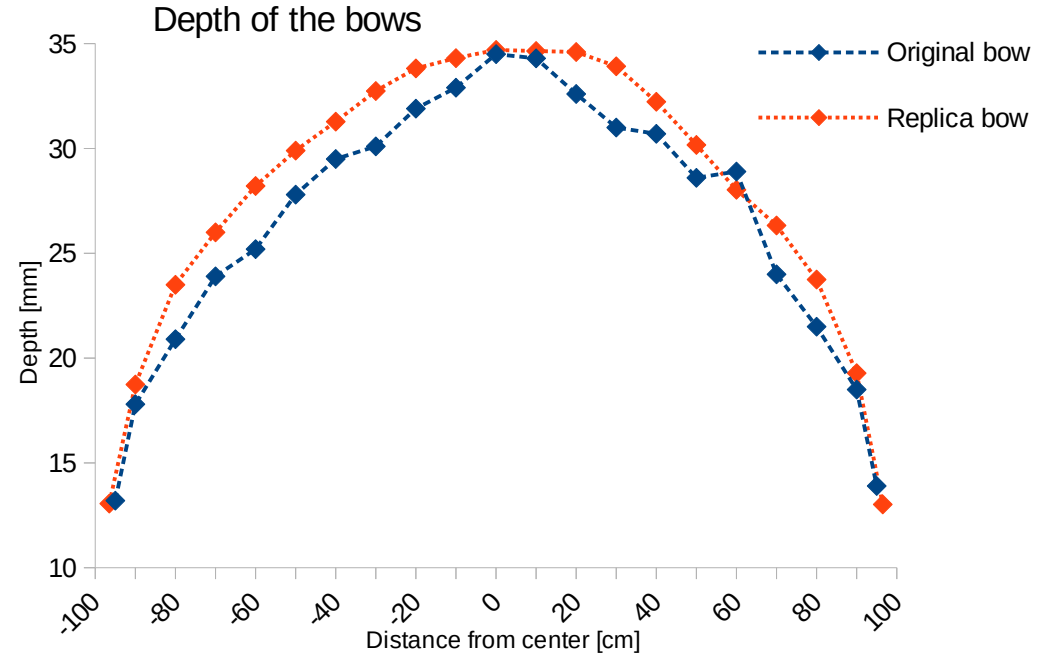
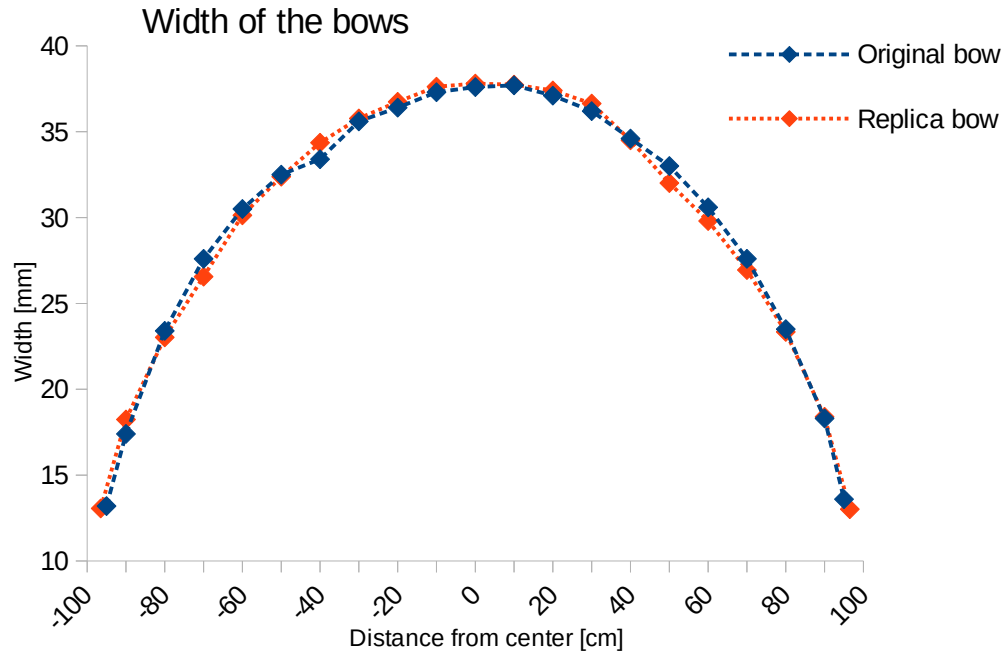
- The set of the bow just after tillering and shooting. View from the upper and lower limb respectively. The total set reads ca. 1 inch.

- The bow was then sanded smooth and the arrowpass highlighted by my burnt bowyers mark.



- Pictures of the finished bow. It has yet several coats of boiled linseed oil and a mixture of oils and waxes.

Comparison with the original bow



- The graphs above show very good agreement of width with the original bow, while depth is bigger along the limbs. The replica bow does not taper so rapidly as the original bow, which has slightly thicker “grip”. If the replica bow was made to match the original dimensions more closely, its draw weight would have been reduced and the shape of its tiller would have resembled rather target bows with stiffer grip area and tips.

Final remarks

- Yew wood has very wide range of mechanical properties, especially Young's modulus of elasticity, which is the crucial characteristic for determining draw weight of a bow of given dimensions. The wood used to build the replica bow is of high quality, in the authors view, "better than the average" .
- The original bow has slightly thicker grip area than would have a bow tillered to bend evenly. Without the thicker grip, it is practically 33.5mm deep in the middle (reading from a quadratic fit for its depth). Shaving down the replica bow to this thickness would reduce its draw weight by 10%, e.i. down to 117lb 30".
- The replica bow has deep D cross section and looks relatively massive. Making the cross section more rounded would reduce its draw weight too.
- The final mass of the replica bow is exactly 1000g compared to the original bow's mass 846g. Partially it is due to greater thickness of the replica bow, but it might indicate that the Italian yew stave that was used to build it is of greater density. However, it is difficult to estimate the mass of 81A3940 when it was new. Sinking in the seawater might have reduced it.
- We may conclude that the original bow was very probably not stronger than 130lb 30". A reasonable estimate would be around 115-120lb 30" if a wood of similar quality to the initial Italian yew stave had been used.