

# Raiding lost arcs

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The Mary Rose Trust recently asked the authors to undertake a study of the survey drawings of the main hull timbers of the *Mary Rose*. There are obvious difficulties in working with data from a hull that was not dismantled, and scarcely exists above the keel on the port side; but also some advantages. The work presented an opportunity to test and develop the techniques required to decipher the geometrical processes locked into the hull remains. It is this, rather than the detail results for the particular ship, that will be presented. Examples of the survey drawings of the *Mary Rose* will be used, by agreement. Neither is the workshop intended to present a comprehensive survey of the numerous recorded variations of moulding methods.

The known methods of constructing ships in the Renaissance over much of Europe relied very heavily on geometry, to form the key frame sections, and to control the variation of successive moulded frames over at least the central part of the hull. Circular arcs, and the results of using certain simple and ancient geometrical devices to generate fair curves, will therefore be present in abundance in many recovered hulls. In principle, it ought to be possible to reconstruct much of the design process from an archaeological context, even if the hull only remains up to the bilge. It ought also to be possible to distinguish frames moulded in the “English” method of pure arcs, and frames where the futtock frames have been rotated about a centre other than the centre of the arc of the mould, by *trebuchet*, *espalhamento* or *joba*.

The theoretical geometrical process of extracting the centre of an arc with compasses from three points does not work well with real data, for obvious reasons; and is at best cumbersome and iterative, and was not used here. An alternative introduces a degree of pattern recognition to accelerate matters, and in fact was further developed as a result of experiences during this study. The process is only complete when the hypothetical reconstruction is tested and correctly generates the hypothetical mould, and apparent tangent arcs are demonstrated to be truly tangent.

The method would be applicable in assessing individual frame timbers too. It can also be extended outside the master frame to investigate hollowing moulds and top-timber moulds.

The longitudinal variation of frames will also be presented in outline, with a description of the main methods used, and how these might be distinguished.