

North Sea technology probes the mysteries of the 'Mary Rose'

Underwater survey techniques developed for North Sea Oil and gas operations are now being employed to chart the wreck of King Henry VIII's warship *Mary Rose*, lying in the seabed off the south coast of England.

The ship, the first English vessel to carry batteries of heavy siege guns as well as lighter weapons already in use at the time, sank in 1545 with her entire crew at battle stations in full view of Henry VIII who was watching from Southsea Castle, near Portsmouth.

Several years ago a *Mary Rose* Committee was formed with the aim of salvaging the wreck and its contents for historical research and eventual display in a Tudor Ship Museum in Portsmouth.

One of the problems on the *Mary Rose* site is low visibility under water which precludes underwater survey by standard methods. Photographic methods have also yielded poor results because of the dense plankton growth in these waters and manual methods of measurement have been slow and inaccurate.

In October 1975 BP, which is a major supporter of the *Mary Rose* Committee, offered to carry out definitive underwater surveys of the wreck using equipment which had been employed on pipeline surveys in the West Sole gas field in the North Sea. The *Mary Rose* presented an opportunity to make a final assessment of the techniques involved and resulted in the most accurate measurements yet achieved with this equipment.

As a first step, radio beacons were installed at points on shore, and from these a course was plotted around the wreck of the *Mary Rose* prior to a survey of the designated area using conventional sidescan sonar equipment. A sidescan sonar survey was carried out to determine the location of the *Mary Rose* geographically, to study the morphology of the seabed and to assist in determining the position of four underwater acoustic (transponder) stations around the wreck.

Frames to house the sound emitting transponders were specially designed and tests were carried out on the strength-bearing properties of the seabed to ensure that the frames would remain on their predetermined positions.

Subsequently the transponder stations were

installed. Using a Rangemeter developed by Sonardyne, a geophysicist took range measurements from 16 fixed points on the port side of the wreck to the transponder stations in sequence; one on the stern and one on the starboard quarter. The measurements were recorded on a cassette tape recorder housed in an underwater casing specially developed by BP.

The measurements were then fed into a computer at BP's research centre near London, which printed out a site plan of the projecting frames of the *Mary Rose* accurate to within plus or minus 10 cm relative to the transponder positions. These results were the most accurate yet achieved using this sophisticated underwater survey equipment. The entire underwater acoustic survey was completed in one week.



Loading a transponder into its frame.

Later it is hoped to add more fixed points to this survey and to undertake a profile survey of the bow of the ship to provide a basis for future estimates of hull integrity.

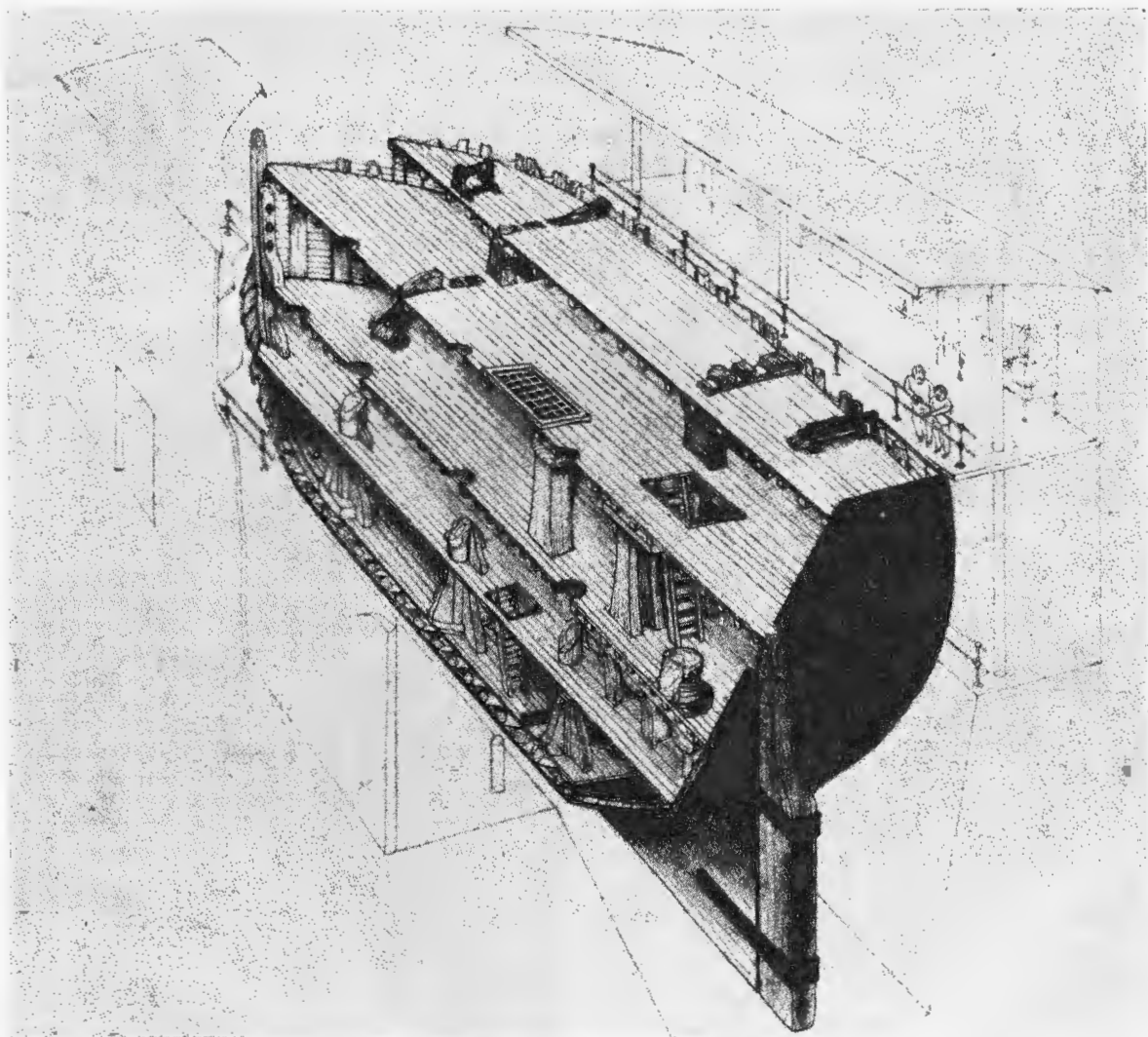
These surveys came at the end of the most successful season yet achieved by the *Mary Rose* Committee. The weather was excellent, resulting in work being carried out on 80 of the total of 84 days on site, and a full-time diving team was available together with the necessary technical support facilities.

The most important discoveries made during the season were that the angle of heel at the stern of the wreck, which was shown to be strong and well preserved, was 60°. Results to date suggest that the starboard side of the wreck is well pre-

served, possibly to the height of the second deck in the stern-castle. Most of the port side of the wreck has been lost by mechanical erosion of the high-lying timbers.

The half hull could easily be accommodated in a museum on the "doll's house" principle, allowing lengthy conservation to be continued while at the same time permitting full public access.

BP Group support for the *Mary Rose* project includes the provision of fuels for the Committee's boats, the loan of two large glass reinforced plastic mooring buoys, provision of chemicals for treating timbers, and scientific advice on preservation and conservation.



An artist's impression of the "doll's house" museum display planned for *Mary Rose*.