MONITORING POST EXCAVATION SITE STABILISATION PROCESS
By Alex Hildred and Peter Holt

The successful recovery of the Mary Rose' (1509 - 1545) from the Solent in 1982 left a substantial crater in the seabed. The legacy also includes a curatorial responsibility for the 26,000 objects, 280 tons of hull structure and a responsibility to monitor the hull depression and artefacts and timbers known to lie within the area of the site, still designated as an historic wreck. Recent human interference within this localised area began with initial seabed searches in the mid 1960's and culminated in four years of intensive excavation between 1979 and 1982. In terms of site destabilisation time, some 22,710 hours or 11.8 man years of twentieth century archaeologically motivated interference.

The Mary Rose Trust and its predecessor the Mary Rose 1967 Committee has always sought to trial prototype equipment which may have applications to underwater archaeology. In fact the anomaly which proved to be the buried hull was first located in 1968 by Professor Harold Edgerton of the Massachussets Institute of Technology using a sub-bottom profiler and side scan sonar, then a relatively new application for this equipment. Previous remote sensing undertaken whilst searching for the site included a Wardle and Davenport magnetometer to search for surface and sub surface metallic anomalies in 1966 and in 1967 an E G and G dual channel side scan sonar linked with a sub-mud acoustic profiler was trialed. In 1975 and 1976 the BP group of companies used a prototype sub bottom profiler to further define the buried structure , and in 1978 stereo side scan equipment was trialed by the University of Birmingham, displaying a stereoscopic pair of side scan images generated simultaneously in real time using two fibre-optic recorders. EMI Electronics provided a sonic camera in 1979 with the aim of evaluating the objects buried on the upper deck before intrusive excavation.

The recording of structural elements combined traditional tape survey with acoustic methods. As early as 1975, Nigel Kelland of Sonardyne Limited spent a number of days undertaking a Rangemeter survey of the ship s timbers. The array depended on the positioning of four transponders supported on steel tripods around the site and fixing their relative positions using the Rangemeter, this enabled over twenty positions to be surveyed within a sixty minute period thereby positioning all key site datums which were used until the lift in 1982. This number of measurements would not be able to be obtained by traditional tape survey on the site with any where near that speed. The accuracy of these relative positions was estimated at 150mm over 2 metres. Further work using the Partridge Rangemeter was undertaken in 1979.

The hull depression measures 34.5 metres in length, with a maximum width of 18 metres and maximum depth below seabed of 5 metres. A substantial area containing unexcavated remains of bowcastle structure lies within the debris field, as do several areas where archaeological remains were reburied insitu rather than lifted. As the ship foundered in 1545 she came to rest on her starboard side, and many artefacts were found in a longitudinal swathe outside what was the starboard side of the ship, now this area is a steep and eroding face.

Post excavation remote sensing has included further sub bottom profiling to quantify the spread of the material generated from the collapse of the bowcastle structure, still unexcavated. In 1994 and 1995 further seismic work was undertaken under a NERC grant to the University of Southampton using a CHIRP high resolution seismic imaging system, revealing several unknown large anomalies around the site.

Post excavation monitoring of the site to understand the ongoing processes of erosion and deposition led to the installation of 16 erosion monitors, all measured to newly installed key datums, the original Sonardyne fixed datum having been removed with the recovery of the hull. The monitors are interrogated annually to provide detailed information about the status of the site and security of objects within the debris field. The development and accessibility of satellite positioning utilising Differential GPS now enables not only relative positioning of datums and objects, but the ability to position these on the surface of the earth with a known accuracy.

In October 1996 site was re-surveyed using a combination of a new technique developed for positioning cables used in seismic oil prospecting and a new, simple underwater tracking system called ROVTrak.

The survey of the site was completed in two steps. Small, lightweight electro-acoustic beacons were first dropped from a boat onto the seabed around the site. The next step was position the beacons on the earth's surface. This was achieved by using a combination of positions from a Differential GPS satellite receiver and distances measured from the boat to the beacons on the seabed. Distances were measured from a unit mounted on the vessel to the beacons using pulses of sound. The combination of positions and distances allowed the beacons to be positioned to an accuracy of 300 mm.

The second phase of the operation was to locate previously marked points on the seabed using a Remotely Operated Vehicle (ROV). The Sonardyne ROVTrak system uses a unit mounted on the vehicle and the beacons on the seabed to track the vehicle as it moves around the site. The ROV pilot can see the position of the ROV on the site on a computer chart alongside the more usual picture from the ROV's own camera.

The principle behind this system has been used in the offshore industry for twenty years, but it is only recently that technology has allowed this system to be made small enough and easy to use. A version of the system for tracking divers as well as ROVs is currently under development.

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