

Since 1987, when it was designated as the repository of all artifacts recovered from the wreck of the USS *Monitor*, The Mariners' Museum in Newport News, Virginia has been conducting conservation on the objects to preserve them for exhibition and study. Included among the recovered artifacts are two direct-acting steam pumps built by the H.R. Worthington Company in Brooklyn, New York.

As with many artifacts within the collection, during the disassembly and conservation treatment of the pumps, material losses due to years of corrosion as well as a structural weakness of some surviving components were revealed.

As the conservation of the pumps progressed, discussion on final display led to dialogue on how to visually convey to the public the pumps' movement without risking damage to fragile components. As a result, conservators started a project in 2009 to create a fully operational replica which would enable visitors to see the pumps in action. The reproduction of the pumps' components required the use of multiple molding methods, laser scanning, computer aided drafting (CAD), 3-D printing technologies, and several casting techniques.

This presentation will discuss the methods and challenges of reproducing a variety of simple and more complex bronze and iron parts by dry-sand casting. The lecture will also discuss what was learned about how the original pump parts were made through identifying marks left on the artifacts from the 1860's casting process; and finally how that information was used to aid in the molding and casting of newly produced replica patterns.