The Ephesus Athlete: A Case Study of the Collaborative Efforts in Exhibiting an Ancient Bronze Statue

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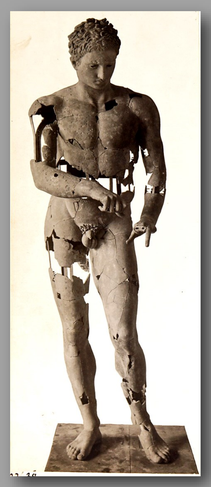
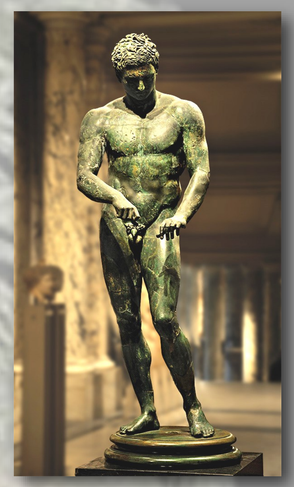
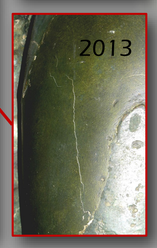


The over life-sized bronze Apoxyomenos (athlete with a strigil) was found in a highly fragmentary state in 1896 during Austrian excavations of the ancient city of Ephesos (Efes in present day Turkey) and restored shortly afterwards. Recovered from a collapsed building context, the statue had been crushed and fragmented into over 200 individual fragments of varying size.

These fragments were physically joined to one another by means of wires soldered to their backsides to form larger anatomical sections that, in turn, were connected to a central iron armature. The assemblage was then filled with cement to create a displayable unified solid whereby the bronze served as an ancient sheathing around a slightly reinforced cementitious core. This construction was little altered for the following 100 years.

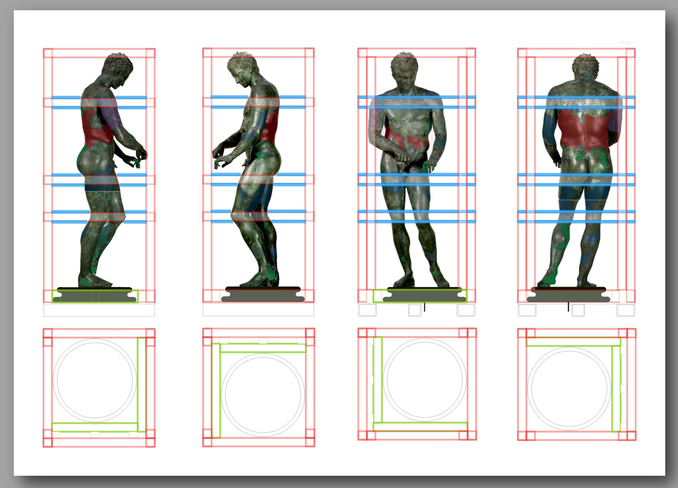


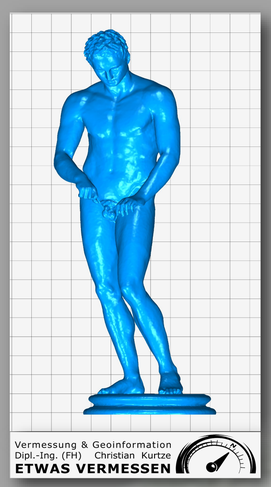
This monumental statue is a center piece of the Kunsthistorisches' Ephesus Museum in Vienna and one of the few surviving examples of a full scale ancient bronze. As such it is of inestimable significance and has been highly sought after for exhibitions. The object was lent only once during the 20th Century, when the fragility of the statue's restoration became fully evident. Accordingly, for the on-going travelling exhibition of *Power and Pathos: Bronze Sculpture of the Hellenistic World*, inclusion of the statue could only be possible after careful consideration.



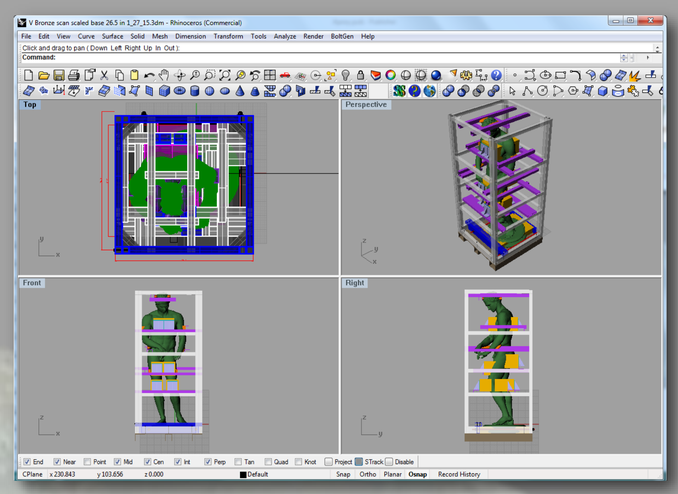
Analysis releveled that stress to the fractures in the aging cement fills, which occurred that last time the statue had been lent in 2001, could be minimized during movement if the following steps were taken:

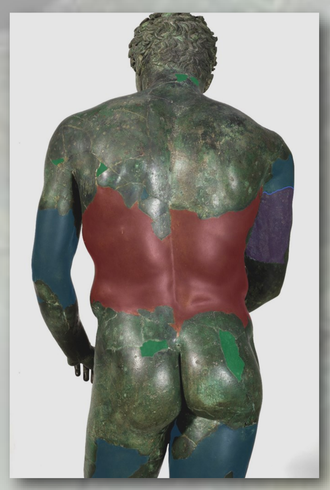
- The statue remained upright at all times
- All lifting was contained to the statue's contemporary base
- A custom aluminum frame would be designed and fabricated to facilitate the lifting and stabilization of the statue during movement.
- The aluminum frame would integrate with a shock absorbing traveling crate that would dampen vibration to the statue during transit.
- A preliminary design was proposed by the Getty and accepted by the lender.





A virtual method of design was decided by Getty staff to utilize an existing 3D scan of the statue that the Kunsthistorisches had commissioned a few years prior. Using the scan and 3D modeling software (Rhino 3D), an aluminum cage and conformal supports were designed and fabricated in advance and assembled around the statue while on display. Although this method had not been tried before, the Getty's Antiquities Conservation department had been experimenting with 3D scanning and it's various applications and felt that this process would allow for a majority of the work to be done in advance, which would tackle a number of logistical problems. www.rhino3d.com

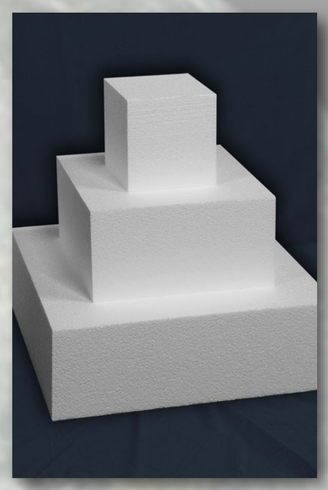


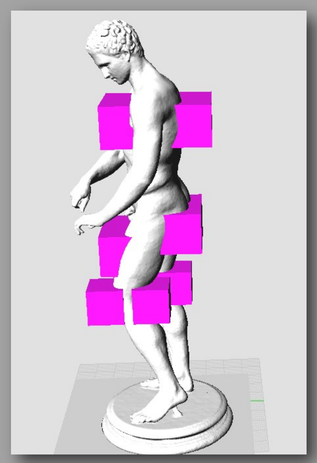


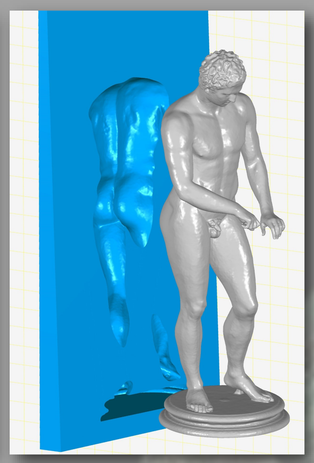
After the conservation analysis of the statue was completed, various areas were targeted that were deemed sound enough to be in direct contact with the conformal supports that would stabilize the statue.

Once the conformal support locations had been determined, the horizontal structural supports of the aluminum frame were located. This was a bit of a puzzle since they would be welded and not adjustable. This is where the Rhino 3D modeling program was invaluable. It allowed for views at every angle and made the proper alignment of all the various components possible. To allow for maximum flexibility, small areas of adjustment were added to certain parts.

A high-density expanded polystyrene foam was chosen for the conformal supports due to its excellent machinability and high compressive strength. The ridged supports were designed to essentially mimic a cast resin interface, which would provide even support and hold the statue firmly in place. This design element was extremely important since the contemporary base was to be held rigidly within the aluminum frame and any large movement at upper part of the statue could risk damage around the feet and ankle regions.

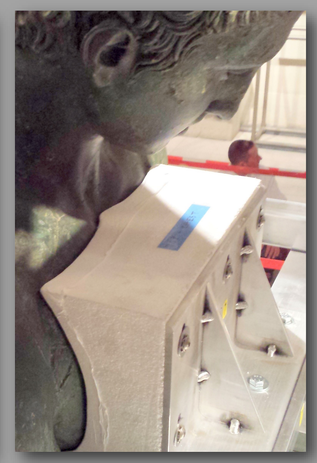






Again using Rhino 3D and the scan of statue, the conformal support blocks were drawn and positioned. These areas were the upper torso, front and back, the lower groin and buttocks and each knee, front and back.

Once positioned, a negative of the statue was cut into each block using the Rhino software. To verify the process and confirm the accuracy of the scan, three trial foam supports were CNC machined and sent to Vienna for a test fitting, which proved successful and only minor adjustments were needed to proceed with the manufacture of the rest of the supports. All of the foam supports avoided sensitive areas on the statue and were lined with Teflon film to reduce possible surface abrasion on the bronze.

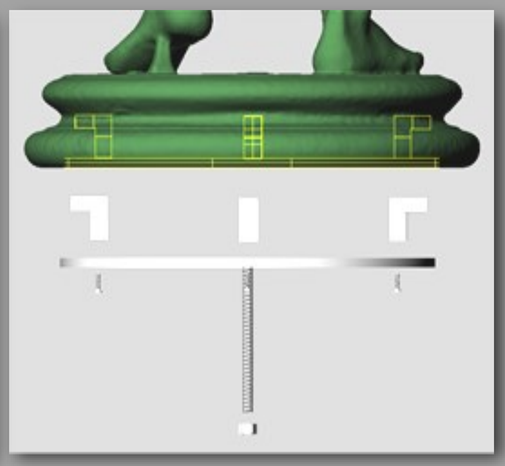


A structural lifting support was integrated into the design of the aluminum frame. The metal and resin support was designed to clamp the round contemporary base of the statue on two sides and put under even compression with parallel threaded rods on either side of the lifting supports. When installed, the support were capable of lifting the full weight of the statue without any pressure on the old restorations or the delicate ancient bronze.

Since complete information of the contemporary base was insufficient from the scan, a section of the base was replicated using a profile template. The replica base section was constructed from an ethafoam core, which was placed on a large turntable. A metal template of the base profile was attached to the frame of the turntable at the proper distance to achieve the correct radius of the base. Layers of resin were applied to the foam core and spread evenly with the metal profile template. Once the base section was complete, it was used as a positive to fabricate cast resin interfaces that were imbedded into structural aluminum frame sections that would be used as the lifting supports.

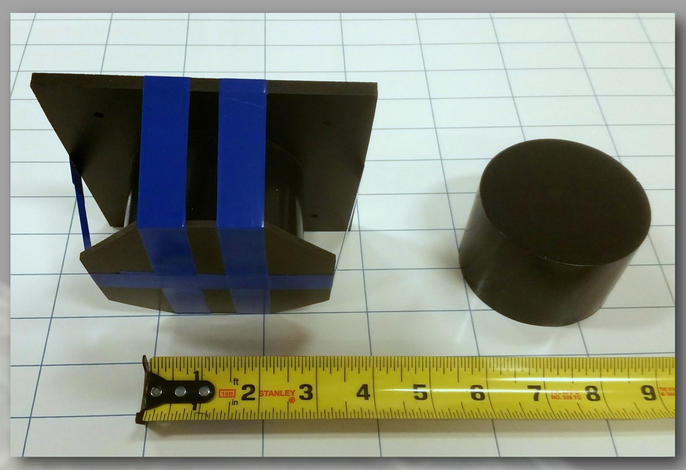
The completed aluminum frame, all of the support components and various tools and supplies were shipped in the traveling crate to Vienna. During a five day period, the aluminum frame was assembled around the statue while it was on display, the statue successfully lifted off its display pedestal, moved to a location that could accommodate the large exterior crate and packed. All of the various components, including the conformal supports fit as planned and validated the 3D modeling technique.

During the de-installation while the statue was suspended, measurements were taken of the inside of the contemporary base that facilitated the design and fabrication of an internal mount that would secure the statute while on display in Los Angeles and Washington D.C. The internal mount consisted of a circular 1/2" thick steel plate and four steel clips that secured the plate to a structural element within the interior of the contemporary base. The plate was threaded to allow for a mechanical connection to the display furniture.



The outer crate utilized a series of elastomers to provide a predefined amount of shock-absorbing and vibration reduction for the aluminum frame that was rigidly securing the statue. The elastomers, from Sorbothane® are a proprietary, visco-elastic polymer that is a thermoset, polyether-based, polyurethane material that combines shock absorption and vibration isolation. www.sorbothane.com

The Company provides a design guide software that assists in the proper product determination. Based on the estimated total weight of the statue, the aluminum frame, and the crate, a 70 durometer puck was recommended to provide an estimated 95% damping for the aluminum frame and statue. A total of 54 (nine per side) elastomer pucks were evenly placed on all the interior sides of the crate.



Battery operated data loggers were used to monitor vibrations during transport. One logger was attached to the outer crate and one unit directly to the aluminum cage. These data loggers utilized an internal triaxle accelerometer and timestamps with all the acceleration time histories, which allowed for a direct comparison of vibrations from the outer crate to the aluminum fame/statue. These values were later analyzed to gain a better understanding of the amount of shock absorption and vibration reduction the Sorbothane® was providing.
www.lansmont.com

While this case study is not a typical mountmaking project, it highlights the collaborative process and brought together the expertise of Getty Conservators, Mountmakers and Preparations with the conservation staff of the Kunsthistorisches' Ephesus Museum and allowed this monumental statue to safely travel to all three venues of the Power and Pathos exhibition.

We would like to thank our colleagues Conservator Bettina Vak and Director Georg Plattner at The Kunsthistorisches' Ephesus Museum in Vienna for their support and collaboration with this project.

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