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PROGRESS REPORT
May 9, 2013
Kosciuszko Monument, Milwaukee, Wisconsin

DISCOVERY

Jim Gwinner, one of our sculpture conservators and the one who came out to prepare the bronze by disassembly for the trip here, noticed immediately when he first climbed up onto the monument that the material inside, apparent at a crack in the bronze, was not concrete nor a cement, as a past study stated, but casting investment. Jim read the report of the past study and finds that the testing does not lead to a conclusion that the material is cement or concrete. The test results can also confirm Casting investment, which is a material most likely to be found within a bronze casting, not concrete nor cement. Casting investment is often left inside cast bronze. It is the residue of the casting shell. It should be removed, however, as it can absorb water, freeze, expand and crack the bronze.

He did not say anything at the time until he could confirm this. When the general was removed from the horse in Milwaukee, he saw the material inside and was then certain it was not concrete or cement used to strengthen the bronze but was just casting investment. With the horse here and another expert on bronze casting, senior sculpture conservator Tom Podnar, having an opportunity to see the material inside, both agreed this material is investment.

Nevertheless, the material has to be removed.

CONSIDERING AN UPCOMING NEW PROTECTIVE COATING FOR BRONZE

We have been working with Dr. Dante Battocchi of North Dakota State University (NDSU) Polymer Research Center testing a new coating he and other scientists there have had in development for over ten years. Dr. Battocchi has such confidence in the product that he

licensed its commercial production from the university. More on that later. First some background explanations are needed.

Outdoor bronzes typically are protected with a resin, such as the acrylic product Incralac, and a renewable sacrificial wax layer or else instead with penetrating, heat applied wax and a renewable sacrificial wax layer on top of that. The use of a resin, while highly protective, has generally fallen into disfavor because any resin eventually fails and needs to be removed and all available resins require chemical stripping to remove them, often with solvents no longer permissible for use outdoors due to their volatile organic compounds which contribute to the carbon of "greenhouse gases." It can also be a difficult and toxic task.

So nowadays, it has become most common just to protect bronzes with head applied wax and a top coat of a paste wax. The paste wax coating needs to me renewed approximately every 2-5 years depending on the location of the bronze with the higher frequency needed for high heat areas. This maintenance paste waxing can be performed by teams of volunteers or park employees. The heat applied wax usually needs replacement by a sculpture conservator about every 10-15 years, depending on the diligence of maintaining the outer sacrificial paste wax.

The NDSU product, which Dr. Battocchi has trade named BronzeShield, is the first reversible urethane. Urethanes are very tough and highly protective resins abut they are chemically crosslinked and cannot be dissolved. Hence they would not be used on outdoor bronze though their protective properties may be desirable.

BronzeShield is the first reversible urethane. It can be broken apart with a biodegradable alkaline chemical. This chemical is safe for skin contact and for washing into the ground. Accelerated aging has proven its future reversibility.

We have been working with Dr. Battocchi for all of 2012 testing this product for him. He had arranged a three day visit to our facilities for more extensive testing, during March 7, 8 and 9, 2013. Thinking that this product may be suitable for the Kosciuszko Monument and offer triple benefit of long-term protection, reduced need for maintenance waxings and also easy future reversibility, we timed the receipt of the bronze here in order to test BronzeShield's appearance and reversibility on the bronze horse.

A set of digital images from the testing March 7-9 accompany this report and are individually identified in a list at the end of this report.

It was our opinion that the appearance of BronzeShield with a top coating of paste wax is identical to other resins with a wax layer or just wax. It promises longer and better protection. The only drawback is the expected cost of over $500.00 a gallon once it becomes commercially available. The product should be available later this summer.

PATINATION

As part of the trials with BronzeShield, we also tested cleaning and patination of the bronze, judging the appearance of cleaning and patination under the protective coating.

A discussion will need to be made with the stakeholders about the options for a final color appearance of the bronze. This is important, not just to gain the participation of the stakeholders in the work, but to arm the stakeholders with information that is likely to be needed for public education. We know the public becomes quite accustomed to seeing green bronze monuments in parks, though almost all were originally a brown color called "statuary brown." The public should be prepared for the return of a beloved monument with a different color.

Very invasive work on this bronze, as is the case with others, will not allow the patching in of some matching green. The entire bronze surface will have to be cleaned and repatinated for achieving an even appearance, then receive a protective coating. Unfortunately, while green patinas can be chemically created on the surface, they are unstable and tend to flake off. They also do not match the beautiful greens that form naturally.

The options are in ranges of brown. The original 'statuary brown" can be recreated if we remove all corrosion products and reach bright bronze again. This will allow the creation of a medium brown with some transparency. At the other extreme, as much of the corrosion products can be left in place by using a mild cleaning procedure and then simply coated. The saturation of the coating leaves the lightly cleaned surface a very dark green/brown. There are options in-between having just a dark brown. An all cases other than cleaning to bright metal and providing a semi-transparent brown patina, the patina will be dark, largely because of the saturation of a residual corrosion crust.

Images accompanying this report show two of the darker results.

All of the month of August is reserved for completion of the treatment of the horse and general. Before then, some additional cleaning and patination testing may be performed. In addition, before August, a decision must be made on surface protection and final color through discussion with the stakeholders.

IMAGES

01. The horse in our shop with senior sculpture conservator Tom Podnar and Dr. Battocchi (blue jacket).

02. Tom Podnar performing a chemical patination of a lightly cleaned area. Cleaning was performed by high pressure washing.

03. A lightly cleaned and patinated area receives heat applied protective wax.

04. The right shoulder received a coating of BronzeShield.

05. Dr. Battocchi examining the right shoulder after wax had been applied over the BronzeShield.

06. The horse is brought outside to judge the effects in natural light and to test the removal of the BronzeShiel.

07. BronzeShield only on lightly cleaned left haunch.

08. Patination and heat applied wax only on right haunch.

09. Patination and heat applied wax only on right haunch.

10. Hot water rinsing during BronzeShield removal.

11. Dr. Battocchi examining the BronzeShield coating (before its removal).