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AESTHETICS, CONSERVATION AND MAINTENANCE OF OUTDOOR BRONZES

W. T. Chase

1. Introduction

Today I'm going to talk a little about aesthetics, conservation, and maintenance of outdoor bronzes. I'd like to thank many people for contributing to this talk, especially The Fairmount Park Art Association, Penny Bach and Laura Griffith, Steve Tatti and Kurt Solmssen, and Nick Veloz. Much of this paper has been drawn from the draft report, Assessment Study Report - Fairmount Park Art Association’s Outdoor Sculpture Conservation and Maintenance Program: Draft 2, W. T. Chase, Chase Art Services, February 23, 2001, and from my short article in Save Outdoor Sculpture Update, Fall, 2001, Volume 12, No. 2, p. 7, “A Program that Works – Fairmount Park Art Association’s Maintenance Program.” All photographs are by the authors except as noted.

When I started on an assessment of the Fairmount Park Art Association’s outdoor sculpture maintenance program two years ago, I had a nice discussion with Rene De La Rie of the National Gallery. Rene said that I should pay particular attention to aesthetics in looking at the treatment problems. We agreed that being more rigorous in terms of the aesthetics of outdoor bronzes would be very useful. As it turns out, I feel more like we’re hanging on by our teeth in terms of aesthetics, and reasonable-looking bronze statues is a good side benefit of good treatments.

2. The Maintenance Program

The Fairmount Park art association's sculpture maintenance program began treatments of outdoor sculptures in 1983. Setting up a program was in the works for a couple of years before this. The idea was to treat and maintain a group of sculptures in Philadelphia as an example of what could be done with a regular maintenance program. Steve Tatti has been the conservator throughout, and he has an assistant, Kurt Solmssen, who performs the actual maintenance once a year.

Figure 1. Kurt Solmssen working on Welcoming Freedom (2002).
Initial treatment was to clean the sculptures with low-pressure water and nonionic detergent, rinse and dry them. The sculptures were then heated with a torch and wax (a mixture of microcrystalline waxes – see box) was applied. This was repeated two or three times until the sculptures were saturated. The wax was allowed to cool and then was buffed for appearance.

Steve Tatti’s Wax Mixture

- 85% Bareco Victory Brown microcrystalline wax
- 10% Bareco 2000 polyethylene wax
- 5% Cosmoloid 80H wax

Fig. 1 shows Kurt Solmssen heating the sculpture Welcoming Freedom at the Samuel Memorial before reapplying wax (photograph taken in 2000). During the annual maintenance program, each sculpture was inspected and then washed. Sculptures near roads or in areas that seemed dirty were also cleaned with mineral spirits. After they were dry the sculptures were heated with a torch, more wax put on where needed, and then buffed.

3. A Test of the Efficacy of the Treatment

We mentioned saturation above. Fig. 2 below shows the sculpture Stone Age in America before treatment in 1982 and after treatment in 1983. You can see that the wax has saturated the powdery green and darkened the whole statue, making it easier to read the sculptural form. (Photographs by Franco Khoury.)

Figure 2. Left, Before treatment (1982); right, after treatment (1983).
As part of the assessment of the maintenance program, we decided to test clean an area to see how reversible the process was and whether subsequent corrosion had taken place under the wax. Kurt test-cleaned an area on the head and shoulder of the child. The photographs reproduced in Fig. 3 show the sculpture before treatment in 1983 (on the left) and after 17 years of maintenance (on the right). The black islands and green background appear to be unchanged.

Figure 3a, b. Detail of the child’s face: left, before treatment; right, after removal of wax in 2000. No change in the size and position of black spots can be seen. Photograph on left by Franco Khoury, 1982.

Figs. 4a and 4b, details of the two photographs, show that the islands are unchanged. Even the fine pores within the islands look the same. We couldn’t detect any difference. As far as this test goes, the maintenance program seems to be performing perfectly.

Figure 4a, b. Enlarged area, detail of the child’s cheek. Left, before treatment in 1982; right, after removal of wax in 2000. Photograph on left by Franco Khoury, 1982.
3.1 Pinholes

Some problems were, however, noticed. There are failure spots in the wax coat which lead to pinholes with corrosion. These disappear in the annual waxing, but are indicative of something happening below the surface. A good example can be seen on the Frederic Remington *Cowboy* seen in Fig. 5. “Pinholes” in the existing wax coat, with bright green corrosion coming up through the pinhole, can be seen in Fig. 6a. My index finger is in here to indicate scale. After heating and rewaxing, the pinholes disappear (see Fig. 6b).

![Image of Frederick Remington's Cowboy sculpture](image)

*Figure 5. The Cowboy, by Frederick Remington. The area shown in Figs. 6a and 6b is in the drapery near the saddle.*
Figures 6a, 6b. *The Cowboy*, by Frederick Remington. Fig. 6a (top) shows the pinholes filled with corrosion. Index finger indicates the scale. Fig. 6b (bottom) shows the same spot after the old wax has been cleaned and heated. The spots have disappeared.
3.2 Crizzling of the Wax

In some cases the wax crizzles or develops a fine crackle pattern. This can be associated with water leaks from the inside of the sculpture, but it also appears to happen in areas devoid of water leaks. It's a phenomenon the needs further study. The crizzled wax comes off in washing, and any that does not come off is reformed when the sculpture is heated. In Fig. 7a, wax crizzling along with graffiti can be seen on the lower part of the Welcoming Freedom statue. Fig. 7b shows wax crizzling in more detail, with a centimeter scale. The wax can be seen not to be adhering to the bronze; little white flakes are forming. With reheating and the addition of more wax, they will disappear.

4. What Happens if Maintenance is Stopped?

Of course, if you stop the maintenance program, these problems are not going to be ameliorated in the annual maintenance and they will continue.

If maintenance is stopped, the wax begins to break down. Initial breakdown seems to be in the form of pinholes like those we saw in Fig. 6a, above. These pinholes allow corrosion to proceed at isolated spots. Since the rest of the surface is protected, corrosion at the individual spots can be quite aggressive. Fig. 8a shows some of the corroded spots from pinhole breakdown of the wax on the Galusha Pennepacker statue along Franklin Parkway in Philadelphia. After removal on the wax with walnut-shell blasting (Fig. 8b), the spots are still visible. They disappear with a subsequent application of wax (Fig. 8c).

In a later stage, the wax can be seen to come off as a brittle film, leaving larger and larger areas of the sculpture unprotected. This sort of failure is seen in Fig. 9a-c, showing various areas of the Washington Monument in Philadelphia.

5. Improved Methods

A number of people have been looking for improved methods for protecting outdoor bronzes. Nick Veloz's wax method gives a coating of wax that lasts 3 - 5 years. Nick starts with walnut shell blasting, which removes any powdery corrosion and evens out the surface appearance of the sculpture. Then wax is applied, first by hand and second with a sprayer. The individual wax coats are heated and, finally, buffed. As you

<table>
<thead>
<tr>
<th>Nick Veloz's Wax Mixture</th>
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<tbody>
<tr>
<td>• 71% Bareco Victory White (or brown, for brown wax)</td>
</tr>
<tr>
<td>• 13% Polywax 2000</td>
</tr>
<tr>
<td>• 13% Petronauba (synthetic camauba)</td>
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<td>• 03% Polywax 500</td>
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will see, this wax seems to fail more generally than in pinholes, another feature that is better for
the sculptures. Nick also points out that the wax seems to last longer in subsequent applications.
The first application after walnut shell blasting won't last as well as the application applied three
years later as part of a maintenance program.

Figures 7a and 7b. Wax crizzling and graffiti on the *Welcoming Freedom* statue. Fig. 7a
shows the crizzling and graffiti on the lower back on the statue. Fig. 7b shows crizzling
at a much higher magnification (cm bar for scale). The crizzled wax looks crystalline.
Figure 8a, b, c. Wax failure and subsequent treatment on the statue of *Galusha Pennepacker*, Benjamin Franklin Parkway, Philadelphia.

Fig. 8a. Corroded spots from pinpoint failure of the wax coating.

Fig. 8b. The statue has been blasted with walnut shells to remove the wax and even out the patina, but the smaller light spots are still visible.

Fig. 8c. The same area after application of a wax coat.
Figure 9a, b, c. Various areas on the *Washington Monument*, Eakins Oval, Benjamin Franklin Parkway, Philadelphia, showing long-term failure of the wax coating.

Fig. 9a. The reclining figure of America where the wax is failing to protect the sculpture.

Fig. 9b. Detail of an area on the leg; old channels from precipitation can be seen running vertically. Some of these are bright green, showing that corrosion is again taking place.

Fig. 9c. The mane of one of the buffalos. Wax loss and subsequent corrosion is quite severe in this area.
Figure 10a shows another statue in Fairmount Park, *The Medicine Man*, after five years outside with Nick’s wax in place. Here you can see wax failure in the lower portion of the headdress and a few other spots. The wax has lasted amazingly well. Fig. 10b shows what the statue looks like after rewaxing. It has a nice, even, deep green patina.

Figure 10a. *The Medicine Man*, Fairmount Park, Philadelphia. After five years of exposure.

Figure 10b. The same sculpture after rewaxing.
Fig. 11 is a closer view of the proper right leg of the statue, showing how the wax deterioration is rather even. A comparison of the deteriorated wax coat (Fig. 11a) and the rewaxed appearance (Fig. 11b) shows that the deterioration disappears on rewaxing.

6. Discussion

In terms of conservation, or simply preserving what's there, the Tatti treatment may be better because no blasting or strenuous cleaning techniques are used. On the other hand, this treatment requires annual maintenance. The wax seems to begin to break down after about a year, at least in spots. If it is left for two years, the corrosion begins to be serious. However, as long as the maintenance cycle is kept up, this is a good way to conserve outdoor bronzes.
The treatment by Nick Veloz lasts longer, but starts with walnut-shell blasting of the loose green material. After walnut-shell blasting, the sculptures are more even in appearance. The wax mixture that Nick uses also seems to be more transparent, yielding a more colorful patina, often a very nice green.

Part of the longer life of the wax in Nick Veloz's treatment may be due to the nature of a different wax mixture. Nick is now putting Tinuvin in the wax in an attempt to get it to last even longer. Part of the longevity, however, is probably due to the better preparation of the substrate and the removal of powdery corrosion products. Walnut shell blasting is producing a small permanent change to the surface of the sculpture, but it is also making it receive the wax better so that the subsequent wax coat will last longer. There are no indications that original surface is being removed from the sculptures -- tests on disposable old bronze show that any cuprite layer on the surface is preserved by walnut shell blasting. Non-adherent corrosion is, however, being removed.

So here we have two treatments, one less intrusive but also maintenance-intensive, and the other slightly more intrusive but with a better maintenance record. In deciding which of these to apply, I believe we need to consider aesthetics, conservation considerations, and maintenance. Budgetary considerations also loom large. Perhaps we really need to consider outdoor sculptures not as fine art but as artistic structures which should be preserved the best way possible. The last thing I'll mention in this talk is the obvious need for future research to improve treatments and to help us define better ways for long-term outdoor sculpture preservation.

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