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1. INTRODUCTION

John Chamberlain (1926–2011) created sculpture from salvaged auto parts and industrial sheet metal. These seemingly ordinary materials present numerous practical challenges for conservators, illuminating biases and incorrect assumptions about his sculpture’s structural stability and long-term preservation needs. This article describes how conservators developed short- and long-term preservation strategies for a collection of 12 Chamberlain sculptures in The Menil Collection. The project provided a unique opportunity for conservators to address the collection as a whole and devise a systematic methodology in regard to description, documentation, conservation treatment, handling, and long-term condition tracking. Chamberlain’s fabrication techniques and the industrially manufactured materials which he transformed into art are described, as are past restoration work and the research, specialist consultations, and artist interviews conducted as part of this project.

2. PROJECT BACKGROUND

The Menil Collection holds one of the most extensive collections of sculptural work by John Chamberlain, consisting of 12 works spanning over 4 consecutive decades of his career. The oldest work in the collection, Untitled, dates from 1964, while the most recent, Cone Yak, dates from 1990. In 2011, the Guggenheim Museum requested two sculptures, Nanowap (1969) and Rooster Starfoot (1976), for inclusion in a major Chamberlain retrospective in May 2012. Most of the sculptures had been in collection storage for over 15 years and had not been assessed during this period. In general, they were dirty, corroded, and had extensive flaking paint, broken welds, and loose and detached parts.

Generously funded by Bank of America’s Art Conservation grant, The Menil embarked on a project to document and conserve all of the Chamberlain sculptures in the collection. The year 2012 marked the 25th birthday of The Menil Collection, and the scholarship and public programs associated with the project would serve to commemorate the museum’s inaugural exhibit of John Chamberlain sculpture in 1987.

METAL HEALTH AND WELD BEING: CONSERVATION STRATEGIES FOR A COLLECTION OF SCULPTURES BY JOHN CHAMBERLAIN

SHELLEY M. SMITH AND CATHERINE WILLIAMS

ABSTRACT

This article describes a new standard of practice for the documentation and conservation treatment of a collection of 12 sculptures by John Chamberlain in The Menil Collection. The documentation augmented and expedited the structural stabilization, cleaning, and paint consolidation work performed. Chamberlain’s fabrication techniques and the industrial materials he used during his mid-career studio practice are also described.
3. HISTORY

John Chamberlain began his artistic career by studying drawing, painting, and sculpture at the Art Institute of Chicago in the early 1950s. After leaving the program, he continued to draw and began creating works in paper collage; eventually his need for immediacy led him to abandon the glue for a stapler. He subsequently became inspired to translate his ideas into metal and took a job at a machine shop outside of Chicago where he learned to weld. The first parts he assembled into sculpture were tin cans and metal rods, which he tack welded together and by 1954, he began exhibiting these works in Chicago. In the mid-1950s, he attended and served as faculty at the highly influential Black Mountain College in North Carolina. This was a formative period for Chamberlain and immediately afterwards he moved to New York where he continued his association with other Abstract Expressionist artists and poets. His experience at Black Mountain College remained a lifelong influence to Chamberlain and is reflected in his titles that reveal his sense of humor, love of word play, and poetry.

Chamberlain's earliest works in metal were made from scavenged materials. Following his interest in color, shape, and volume he began using larger pieces of painted sheet metal and chrome parts obtained inexpensively and in great quantity from scrap. Over the course of his career, Chamberlain maintained a relatively mobile studio practice moving both within New York State and back and forth across the country. Ever resourceful, he would obtain materials from local metalworking shops, auto body shops, and junkyards using anything from oil drums to furniture, large appliances, galvanized steel, and automotive sheet metal depending upon available materials and his interests at the time. For example, though he took a hiatus from incorporating automotive metal in his work from 1965 until 1972, much later in his career he bought cars specifically to process into raw materials. He also used other artist’s discards, and infrequently, a new material if it really caught his fancy. His works at The Menil Collection represent his established mid-career studio practice, from 1964 through 1990.

4. CONSIDERATIONS BEFORE TREATMENT

Chamberlain became known for his massive, brightly colored metal sculptures, their complex volumetric forms giving them a sense of lightness. Although the use of steel might give the impression of strength and durability, these qualities are illusory. While some of the sculptures have sturdier structural elements such as bumpers and automotive brackets to support large sections, they generally lack a central supporting framework. Because of his construction techniques, some of the larger sculptures are incredibly heavy and also very delicate.

The 12 Chamberlain sculptures in The Menil Collection range in size. Wall Sculpture (1983) is relatively diminutive, measuring a mere 30 in. in height (fig. 1), while Kunststecher (1977) represents an average height at 6 ½ ft. The largest work in the collection is American Tableau (1984), measuring 21 ft. in length and 12 ft. at its highest point (fig. 2). It is composed of 14 separate sections, each as complicated as any one of the other 11 sculptures alone.

4.1 SOURCE MATERIALS AND CONSTRUCTION

Chamberlain constructed his sculptures spontaneously, without preliminary drawings or plans—a practice founded in assemblage art. Though his mode of working was technically more like 20th-century collage, aesthetically and philosophically it was grounded in Abstract Expressionism. Using discards from industrial society as art supplies allowed him to spontaneously doodle in three-dimensional space. These materials had a history of their own prior to being incorporated into his work. Furthermore, he would intentionally shape pieces in inventive ways, such as running over the parts with cars, or using industrial machinery such as paper balers and compactors, and would cut them with drills, band saws, and torches.
Fig. 1. Before treatment. John Chamberlain, *Wall Sculpture*, 1983, painted steel, 76.2 × 20.3 × 7.6 cm, The Menil Collection, ZZ 703 (Courtesy of Paul Hester)

Fig. 2. Tom Walsh, head of Art Services at The Menil Collection, peering out from behind the sculpture. John Chamberlain, *American Tableau*, 1984, painted and chromium-plated steel, 365.8 × 640.1 × 335.3 cm, The Menil Collection, 1984-47 DJ (Courtesy of Adam Baker)
This makes it very difficult, if not impossible, to differentiate between artist’s marks and old versus new damage.

The process of building a work involved layering panels and fitting parts on top or against each other, securing them with quick tack welds or less frequently, fasteners. This allowed Chamberlain to quickly undo things if he changed his mind. Evidence of this is seen where there are tack welds without an associated part. Weak tack welds that break with some frequency are therefore symptomatic of his working process, which unlike classical sculpture is not based upon an underlying structural framework. Since the work itself cannot be separated from the spirit and manner in which it was created, the only approach to correcting the problem is to maintain as best one can the interconnectedness of the individual parts.

4.2 WELDS

The welds on his earlier works tend to be especially weak and are relatively small and poorly executed. Their poor quality was primarily due to insufficient heat when melting the filler rod and substrate together. These welds have islands of metal from filler rod mixed in with bubbly slag accompanied by voids, holes in the base metal from blowouts, and ribbons of heat scarring. By contrast, his later welds are vastly improved, tending to be longer and more continuous, and having a characteristic caterpillar or stacked coin appearance. He did the welding on the earliest works himself, but later on it was more likely to have been done by his assistants using shielded gas electric arc welding machines.

Chamberlain was well aware of the problem of weak welds. Early on, he lost several works to poor packing and shipping. These literally exploded apart during transport and were subsequently destroyed according to his wishes. When faced with less severe damage, he responded by repairing the sculptures at his studio or sending one of his assistants to do the repairs on-site. This practice became so routine that his studio created a standard record sheet to keep track of the repairs.

In two filmed interviews done at The Menil in 1987 and in 2000, Chamberlain expressed his displeasure with broken welds and his desire for them to be repaired. In the later interview, he also recognized that there were instances where damage could not be reversed to bring a work back to a previously known state of existence. Because as he put it this would require the use of “magic,” which is not normally part of a conservator’s toolkit. Nonetheless, he preferred to have broken parts repaired when possible because he disliked the appearance of sagging, which leads to more strain and greater stress further compounding the damage.

4.3 INHERENT AND ARTIST APPLIED COLOR

In addition to the construction process, the use of color was fundamental to Chamberlain’s work. Not only would he use the colors inherent to the raw materials, but he would also add his own color by dripping, flinging, and pouring paint across piles of parts. As a result, the same paint can show up on separate pieces within a sculpture, and on other sculptures made around the same time. He would use whatever paint struck his fancy: house paint, automotive paint, hobby shop paint, varnishes, and glitter paint. A detail from Clytie II (1976) seen in figure 3 shows three layers of artist-applied paint—a drip of red, a transparent dark blue, and a light sea foam green—all of which were applied over the original dark blue automotive paint. It was also applied directly over rusted spots where the automotive paint was lost long before. Lumps in the light green layer are from a skin that formed and became mixed in with the paint before it was poured on.

The paint applied by Chamberlain became the first priority for stabilization because it tended to be poorly adhered to the substrate. Chamberlain accepted certain phenomena as integral to his practice, such as paint losses occurring in areas that were bent or folded, which he likened to “eraser marks” such
Fig. 3. Top: Overall view. Bottom: detail of losses in the paints (discussed below) and lumps in the artist applied paint. John Chamberlain, *Clytie II (Only Women Bleed... for Alice)*, 1976, painted and chromium-plated steel, 149.9 × 170.2 × 55.9 cm, The Menil Collection, 1992-21 (Courtesy of Paul Hester)
as those on *Rooster Starfoot* (figs. 4, 5). Because of the artist’s acceptance of this phenomenon as being part of the process of production it would not be a candidate for retouching. The type of damage shown in figure 3 detail of *Clytie II* might have been however, it could not be determined from the existing photographs and condition reports when and how the damage had occurred. Although this did not seem disturbing to him, at least in retrospect, the decision was made during the course of this project to reduce further loss by shoring up the edges of such paint loss with thickened adhesives.

A detail of *Kunststecher* in figure 6 shows losses in the blue automotive paint and deep cracks and lifting in the artist-applied paint. The larger losses in the rest of the paint had pulled off the blue automotive paint below. Oftentimes there were multiple paint layers exhibiting lifting and flaking with
large losses. The colored panels have many different types of paint and coating layers, with chips, losses, and scrapes from their former use as appliances and automobiles. Chamberlain prepared his surfaces minimally or not at all, often painting directly onto dirt, wax, grease, and rust, which makes the paint vulnerable to peeling off in large sheets.

No inpainting was done during the project, though the treatments conducted do not preclude it in future. “Eraser marks” would not be a candidate for retouching since they were an accepted part of the production process. Paint losses such as those as shown in the figure 3 detail of Clytie II might have been however, it could not be determined from the existing photographs and condition reports when and how the damage had occurred. (Courtesy of Shelley M. Smith)

During consolidation, the abundant remnants of lint from previous dusting cloths were picked off with tweezers. The fragility of these paints is further argument for careful maintenance and for storing the sculptures under optimal conditions to prevent dust accumulation.
Chamberlain’s use of coatings was inconsistent and the reason for their presence is not always clear. Only the more recent works in the collection, such as *American Tableau* and *Cone Yak* (1990), have a thick varnish overall. Its use on *American Tableau* is perhaps more understandable because it was originally exhibited outdoors, however, with *Cone Yak* it is apparently an aesthetic choice given the small scale of the work. The presence or lack of coatings and varnishes was noted but none were applied during the treatments. In practice, the polyurethane coating used by Chamberlain offers little in the way of rust protection, especially after it itself has begun to deteriorate. Wax, which has even less effect in an indoor environment, could collect dust and preclude future treatments.

### 4.4 PHOTOGRAPHIC DOCUMENTATION AND COMPARABILITY

As three-dimensional collages, the sculptures appear different if not unrecognizable from every viewing angle. Though the provenance and archival records for each were investigated, this research yielded surprisingly little written or photographic documentation, even though several of the works had been exhibited extensively. While it was obvious that the works had been altered over time, it was impossible to determine exactly when, where, or how these changes occurred. It was decided that to begin with, each sculpture would receive systematic photographic documentation.

Each sculpture or freestanding section was photographed at every 45° angle, giving eight different views. Because the floor sculptures have no discernible front or back, a rotating platform ensured that the center axis for each shot would remain consistent while limiting the amount of handling required (fig. 7). Birds-eye-view shots were taken of freestanding floor sculptures using a scissor lift. The distance from the front plane of each sculpture to the camera sensor was recorded on log sheets, as were the distances
Fig. 7. *Nanoweap* photographed on a rotating platform to record consistent viewing angles. John Chamberlain, *Nanoweap*, 1969, painted and chromium-plated steel, 135.3 × 151.8 × 102.9 cm, The Menil Collection, 1974-129 DJ (Courtesy of Paul Hester)
between the center height of the camera sensor to the floor. This was done to allow an examiner or photographer to duplicate the exact viewpoint for future comparison. Because of the large size of most of the sculptures, high-resolution digital images were needed to capture enough information to allow for zooming in to see surface phenomena. For this purpose, the photographer used a Nikon D3X digital SLR camera with 24.5 megapixel full frame sensor, equivalent to 36 × 24 mm film.

Every part was assigned a number in order to track condition and treatment. Numbers were also assigned to each weld and fastener on sculptures requiring structural stabilization. These numbers were transferred onto photographs uploaded onto an Apple iPad. ArtStudio proved to be the most user-friendly software for drawing and annotation. The numbered images provided for systematic and efficient recording of condition notes, solubility tests, cleaning tests, and treatment notes. All of this and corresponding data were entered into Excel spreadsheets, where each part was described and identified noting its relative position, type and color of material, and presence of other materials, such as rubber gasketing, pin striping, artist-applied paint, and fireproof insulation material. This helped set clear treatment priorities for each sculpture based upon the most urgent condition problems. Once the system was established for the first sculpture to be treated, it was applied to all remaining works. The numbered photographs and spreadsheets were filled out and used concurrently throughout the entire project.

This system was especially useful for monochromatic sculptures such as Folded Nude (1978) (fig. 8) and Nanoweap (1969) (fig. 9), since their more complex stratigraphy of folded and entwined layers of twisted metal are visually confusing. In addition, Menil photographer, Adam Baker, created a time-lapse video of one four-day treatment. This video proved especially helpful when it came time to consolidate notes, and it was interesting to be able to see the sculpture change its shape as the work progressed.

Fig. 8. Left: Before treatment. John Chamberlain, Folded Nude, 1978, painted and chromium-plated steel, 198.1 × 193 × 53.3 cm, The Menil Collection, 1992-23 (Courtesy of Paul Hester). Right: Folded Nude on-site in the old ice plant building at the Chinati Foundation in Marfa, Texas, where it has been on long-term loan (Courtesy of Shelley M. Smith)
Fig. 9. Top: Detail from Nanoweap (1969) before treatment showing nuances in the monochromatic coloration the authors wished to retain. Bottom: Red paint that was not removed during cleaning because it was not known when it occurred. The round losses in the paint were allegedly caused by shotgun blast. (Courtesy of Shelley M. Smith)
4.5 ACCESS AND HANDLING

In addition to being very heavy, most of the larger sculptures are also unwieldy, with few load-bearing handholds and unpredictable centers of gravity. The largest, heaviest sculptures squeak and groan when lifted, parts vibrate and move, and glassy brittle slag will pop and careen unexpectedly from welds. Handling the sculptures remains difficult, and even though they were put on new four-way pallets for easier movement throughout the museum building, they still needed to be lifted onto the photography platform, and when exhibited they are customarily placed directly on the gallery floor—though several photographs were found of the works placed by the artist on different types of plinths similar in appearance to wooden pallets.

4.6 CONSIDERATIONS FOR STRUCTURAL REPAIRS

The decision of how to repair broken and cracked welds was carefully thought through. Options for temporary repairs were considered first, namely adhesives such as acrylics and epoxies. These were ruled out for a number of reasons. Long-term structural stability was an important factor for parts that support the weight of adjacent parts, or those under tension and pressure. Many of the broken welds were located in hard-to-reach places that would make the clamping necessary for an effective join difficult, if not impossible. Most of the paints on the sculpture were found to be sensitive to solvents, bringing up questions of reversibility, and a single sculpture would require several different adhesives used in combination to provide the required strength.

In preparation for welding during the original fabrication process, the artist or his assistants, working in haste, would clean or prepare only the smallest area necessary to make the weld. Because of this, the polychrome tends to be within or border very closely to the weld zone, making it impossible to avoid the paint with an adhesive repair. These hurried welds were often done on poorly prepared substrates, and as a result contain unmelted metal filler rod, slag, voids, thick oxidation, and corrosion that were extant or had developed later. Any adhesive applied to repair welds such as these would wick in and creep through these porous materials and could interfere with future repair work if the adhesive proved unsuccessful.

Adhesives become brittle and discolored over time and will eventually require removal, and a successful join also requires a much cleaner substrate than is necessary to get a good TIG weld. Lastly, the use of an adhesive for structural repairs would result in the addition of materials that were not in character with the artist's working methods nor with metal working techniques more appropriate to the construction with inbuilt stresses and loads.

No treatment in this situation can be considered truly reversible, and the authors instead opted for reproducibility and unequivocal documentation, ultimately choosing welding as the best solution. It is also in keeping with Chamberlain's own repair practice. Handwritten forms provided by Chamberlain's studio that served as records of repair in the Menil conservation files and in the Leo Castelli archive at Smithsonian Archives of American Art provided evidence that the studio regularly repaired broken sculptures both in Chamberlain's studio and by sending his welder to sites.

5. TREATMENT

The treatment goals were to clean the sculptures where appropriate, consolidate peeling and flaking paint, perform structural repairs to broken or cracked welds, and realign parts where possible. Large gaps between parts were caused by tension released when welds broke from concurrent or subsequent deformation. Because of these breaks, entire sections would move and flap causing more scratches and paint loss on adjacent parts. Loose and missing fasteners, seen on several of the sculptures in the collection, posed a similarly important structural issue. Vibration from movement and handling had
substantially loosened all of the fasteners over the years. However, machine screws used without nuts and fasteners that had pulled through holes that were too big were especially problematic.

5.1 CLEANING AND PAINT CONSOLIDATION

For all of the sculptures, each part and every type of paint was tested individually for solvent sensitivity to determine the most appropriate cleaning method. This information also aided in the selection of appropriate adhesives in different solvents tailored to the existing condition, such as poor adhesion, deformation, or mechanical damage. The results of these tests were recorded in spreadsheets so that when it came time to do the work, conservators could quickly refer to one another’s notes, making the selection of appropriate materials consistent and efficient.

Chamberlain’s studio kept written records of the work that was done and provided owners with specific instructions for cleaning and polishing, and from this it is clear that the sculptures were intended to be clean. Though cleaning the more deteriorated surfaces was especially tailored to specific surface issues, for example, undersides of the parts that had remnants of spray insulation, coatings limited cleaning options in these areas to dry cleaning techniques.

Cleaning was carried out by first gently dusting with a soft brush into a HEPA vacuum, but only in areas or parts that would tolerate it. There were many places where the paint was too fragile to withstand dry dusting. These were consolidated in advance of cleaning. In a few instances where rust was visibly more active beneath the paint layers, consolidation was preceded by the application a corrosion inhibitor. This also had to be dried carefully to avoid the formation of tide lines in matte textured surfaces. Two sculptures, *Folded Nude* and *Nanoweap* (figs. 8, 9), underwent selective cleaning to avoid an unevenly cleaned appearance overall.

The sculptures had many difficult to reach voids and crevices, some with severely flaking paint that made even simple dusting a daunting prospect. In some cases, these difficult to reach areas were not cleaned or consolidated because they were impossible to access. Though it was considered, compressed air was not used because it is hard to control and can blow off delicate paint flakes.

Artist-applied paints were given first priority for consolidation because they were more fragile due to poor adhesion than more robust industrial paints, which were designated as second priority. In a similar way, areas of peeling and flaking paint were prioritized over areas that were cracked but better adhered. Though prioritization was necessary to meet the time constraints of the project, it was done with the understanding that the work can be continued in the future.

In general, the artist-applied paints remained flexible to varying degrees and responded well to heat and solvents to lay back down. The industrial paints were typically brittle, multilayered, and thick, with lifting and curling edges. Care was taken to leave their appearance as close to their present state as possible, since their distortion was caused when the artist manipulated the materials. Attempts to flatten these would result in breakage and a crushed appearance.

5.2 TIGHTENING OF FASTENERS

After consolidation and corrosion passivation in the most sensitive or difficult to reach areas was achieved (fig. 10), the work proceeded to adjusting fasteners. This was done on two of the sculptures, and it was decided that the best way to proceed was to begin in the areas where the artist might have begun stacking the parts, continuing in one direction where they attached to or touched other parts.

All fasteners were hand tightened and bolts were secured in place. Sheet metal screws, many of which had loose or lacking nuts, were replaced with regular screws and nuts. Their removal date, type, and original locations were recorded, and then bagged, numbered, and retained.

Chamberlain used many washers to fill gaps between parts on their reverse side (fig. 11). These washers acted as shims in *Rooster Starfoot*, resulting in the decision to use additional washers to fill gaps
created by the attachment of odd-shaped parts or the modification to those parts over time. Guido Schindler suggested locking the end nut in place with Loctite, a liquid applied below the nut that prevents it from moving. However, lock nuts were used instead, since reversing Loctite would require heat or solvents. In keeping with the artist’s practice, spacers such as metal washers were added as needed to realign loose or popped screws and to fill gaps between them. In a couple of instances, the gap was so large and located in such a highly visible area that pieces of Tygon or metal tubing were instead used along with longer screws or bolts (fig. 12).

5.3 WELDING
Welding is extremely risky and results in permanent, irreversible change to the sculptures. Thus, the decision to repair a broken weld was made on a case-by-case basis. No two welds were alike therefore nothing was taken for granted. Each weld was examined carefully taking into account the cause of its original appearance, present condition, the cause of its failure, and potential for future failure. The welding was performed by Guido Schindler of Schindler Metalworks in Houston in close collaboration with conservators. He had successfully completed a challenging project at the Menil several years prior, and at that time had been interviewed and selected from a pool of candidates. He was chosen not only because of his over 25 years of experience, but also because he understood the importance of minimizing the effects of new welding on original material. After evaluation and agreement on the final aesthetic result, he would proceed by making adjustments according to the substrate and the state of the original weld. In all cases, Schindler took care to preserve the characteristically messy appearance of the original weld. However, there was never an attempt to disguise the bright new weld, ensuring that it would remain easy to differentiate.
Fig. 11. Top: The additional washers needed in contrast to the rustier originals. Bottom: The new lock nuts used in addition to the originals. (Courtesy of Shelley M. Smith)
Fig. 12. From Top to Bottom, a popped screw on *Rooster Starfoot* (1976) was replaced by a longer bolt because of subsequent distortion of the parts, which no longer fit tightly together. Tygon tubing was used as a flexible spacer because of continued movement between these parts. The image on the far right shows a galvanized steel tube that was cut to length and used as a spacer in an immobilized but highly visible area. (Courtesy of Shelley M. Smith)
TIG welding was used because it provides the highest-quality welds by allowing for precise control of heat. This is especially useful for thin materials, which was the dominant situation here. TIG welding utilizes a separate stick for the filler rod and a tungsten electrode with shielding gas. In addition, its small nozzle enables access to tight areas. This gave Schindler the option of working excess slag on the surface rather than removing it if he felt he could get a good weld. Some of the welds had so much original filler rod sitting on the surface that he was able to melt the excess into existing material.

TIG welding also provides a highly localized heat zone for the shortest time needed to get a good weld, thus preventing the heat affected zone from visibly extending beyond the original. The heat affected zones surrounding the welds on the older sculptures are prominent, since the artist did not clean them up much afterwards. They appear as radiating burn rings of soot, charred paints, and in some cases burned plating or insulation materials.

Figure 13 shows the before and after results of a repair to a weld that joins two chrome bumpers across a pair of bolt holes. In the photo on the left, the front of the weld is cracked across the center. The photo on the right of the weld after treatment shows that the red surface oxidation is gone, but there is almost no difference in the topography of the weld.

6. CONCLUSION

This project addressed dilemmas in the conservation treatment of artworks where treatment methods that are most suitable for the sculpture and integral to maintaining the artist’s intent challenge traditional conservation ethics of minimal intervention and reversibility. At the conclusion of the project, the provenance for all 12 sculptures had been thoroughly researched and enhanced, with some corrections made to The Menil Collection archives. Each sculpture was thoroughly examined and documented using standardized documentation protocols. All freestanding sculptures or sections were placed onto new, four-way plastic pallets lined with moisture resistant Homasote for easier transport throughout the museum building.

Structural repairs were completed on four sculptures, which included welding broken or weak welds. 11 of the sculptures were cleaned, including all 14 sections of American Tableau. Consolidation of artist-applied paint was the first priority and after that was achieved, curled and flaking paint was consolidated as time permitted. Nanoweap and Rooster Starfoot were exhibited in Choices, John Chamberlain’s retrospective at the Guggenheim Museum. Several works, including American Tableau, were installed at The Menil for the 25th anniversary festivities. It was found that the older sculptures suffered from more broken welds than the more recent works. Surprisingly, the biggest and more recent works, such as American Tableau and Elixir (1983), were found to have not a single broken weld, though they did have some bends, scrapes, and abrasions.

The installation of American Tableau took two full days and was documented photographically with detailed measurements recorded to aid in mapping out future installations. It was only during this installation that the apparent changes that occurred to the sculpture over time could be fully understood, namely past alterations that visibly affect the way the parts now fit together. This orientation was accepted and no attempt to refit the individual units was made, either where rub marks indicated they were once in contact or to adjust bent brackets. This decision reflects doubt on whether these changes had occurred deliberately by the artist or incidentally. A wall bracket was designed and fabricated for Clytie II and a collapsible metal armature for travel was made for Rooster Starfoot. To date, Chamberlain’s estate has not approved his interviews for public viewing but these can be accessed in person at The Menil Archives in Houston.
Fig. 13. Top: The weld before treatment. Bottom: After treatment, the new material that was added is visibly brighter. (Courtesy of Shelley M. Smith)
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REFERENCES


FURTHER READING


SOURCES OF MATERIALS

3M microballoons Scotchlite glass bubbles
3M Center Building
St. Paul, MN 55144-1000
(888) 364-3577
[http://www.3M.com/microspheres](http://www.3M.com/microspheres)

Paraloid B-72
Rohm & Haas (mfr.)
100 Independence Mall West
Philadelphia, PA 19106-2399
(800) 258-2436
[http://www.rohmhaas.com](http://www.rohmhaas.com)
Tannic acid
   CAS No. 1401-55-4
   Sigma-Aldrich
   3050 Spruce St.
   St. Louis, MO 63103
   (800) 325-3010
   https://www.sigmaaldrich.com/united-states.html

Tygon tubing
   Saint-Gobain Performance Plastics (mfr.)
   United States Plastic Corp.
   1390 Neubrecht Rd.
   Lima, OH 45801-3196
   (800) 809-4217 x711

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