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Author(s): Eleonora E. Nagy, Bettina Landgrebe, and Shelley M. Smith

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Street NW, Suite 320, Washington, DC 20005. (202) 452-9545

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# TREATMENT OF DONALD JUDD'S *UNTITLED 1977*: RETENTION OF THE ORIGINAL ACRYLIC SHEETS

ELEONORA E. NAGY, BETTINA LANDGREBE, AND SHELLEY M. SMITH

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## ABSTRACT

This paper presents a new treatment method for Donald Judd's geometric, three-dimensional works comprised of acrylic sheets adhered to metal supports. The purpose of this paper is to establish a new standard for retaining, rather than replacing, the original acrylic sheets, which are a critical component of such works of art.

## 1. INTRODUCTION

Donald Judd's (1928–1994) three-dimensional works consist of single or multiple, seemingly simple geometric forms intended to create specific spatial arrangements within a specified physical environment. These boxlike units are usually stacked and attached to a wall. Although they appear mass-produced and industrial, these works are unique objects fabricated by highly skilled craftsmen. They closely reflect the industrial methods of the period in which they were made as well as the specific skills of the individual craftsmen who completed them under Judd's close supervision.

## 2. HISTORY

Judd began using metal and acrylic sheets in his works in the early 1960s. Initially, the two materials were assembled, but by the mid 1960s, Judd had begun adhering the acrylic sheets to the metal sheets to form boxlike units.<sup>1</sup> Commonly referred to as “wrap-arounds,” the units consist of acrylic sheets that are adhered to the front and sides of the underlying metal sheets. The acrylic sheet on the front of the unit overlaps the cut ends of the acrylic on the unit's sides. The overlapping edges of the acrylic are rounded to complete the wrap-around effect. The wrap-arounds were often made of galvanized steel, copper, brass, and, most commonly, stainless steel. The acrylic sheets varied in color but were typically blue, green, violet, and red.

The first-known work utilizing adhered acrylic sheets—*Untitled 1967*, DSS104—was made by Judd in 1967.<sup>2</sup> He subsequently completed a flurry of wrap-around stacks in the late 1960s. Undoubtedly, the bulk of wrap-arounds were made in the late 1970s, but their production continued until the artist's death in 1994. In the absence of a catalogue raisonné, a precise account of wrap-arounds cannot be ascertained. Nevertheless, it can be stated that works of this type became one of Judd's signature works, and numerous wrap-arounds may be found in museums, private collections, and commercial galleries throughout the world.

*Untitled 1977*, the topic of this paper, is situated in Judd's residence in Marfa, Texas, which is now a museum (fig. 1). During his lifetime, Judd developed Marfa as a site for permanent installations of his works (fig. 2). *Untitled 1977* is a large indoor artwork comprised of 10 identical rectilinear units stacked vertically and mounted on a wall.



Fig. 1. *Untitled* 1977. Stainless steel and acrylic sheet, 10 units, each 9 x 40 x 31 in. (22.8 x 103.3 x 78.8 cm), mounted at 9 in. (22.8 cm) intervals (Courtesy of Donald Judd Foundation, photograph by Shelley Smith)



Fig. 2. *Untitled* 1977 (on left), Donald Judd's residence "The Block," Donald Judd Foundation, Marfa, Texas (Courtesy of Donald Judd Foundation, photograph by Shelley Smith)

Each unit is 9 x 40 x 31 in. and separated on the wall at regular intervals of 9 in. The units are constructed of stainless steel. The top, front, and bottom of each unit were formed with a hand brake from a single metal sheet. The sides consist of two separate stainless-steel sheets folded into pans and bolted to threaded rods along the inside seams. After the stainless steel boxes were fashioned, the fabricators adhered approximately 0.125 inch-thick blue acrylic sheets of 606-0 TL to the full front and sides of the metal units, using contact cement. The corners of the three sheets were butt-joined, and the overlapping front edges rounded (fig. 3).

Treatment of *Untitled 1977* was prompted by adhesive failure of one of the acrylic sheets in the fall of 2008. The stack was de-installed to avoid further detachment and potential breakage of the acrylic sheets. A following closer inspection revealed that 20 of the 30 total acrylic sheets were delaminating to various degrees, in addition to other problems with the work. It became obvious that an overall treatment was required.

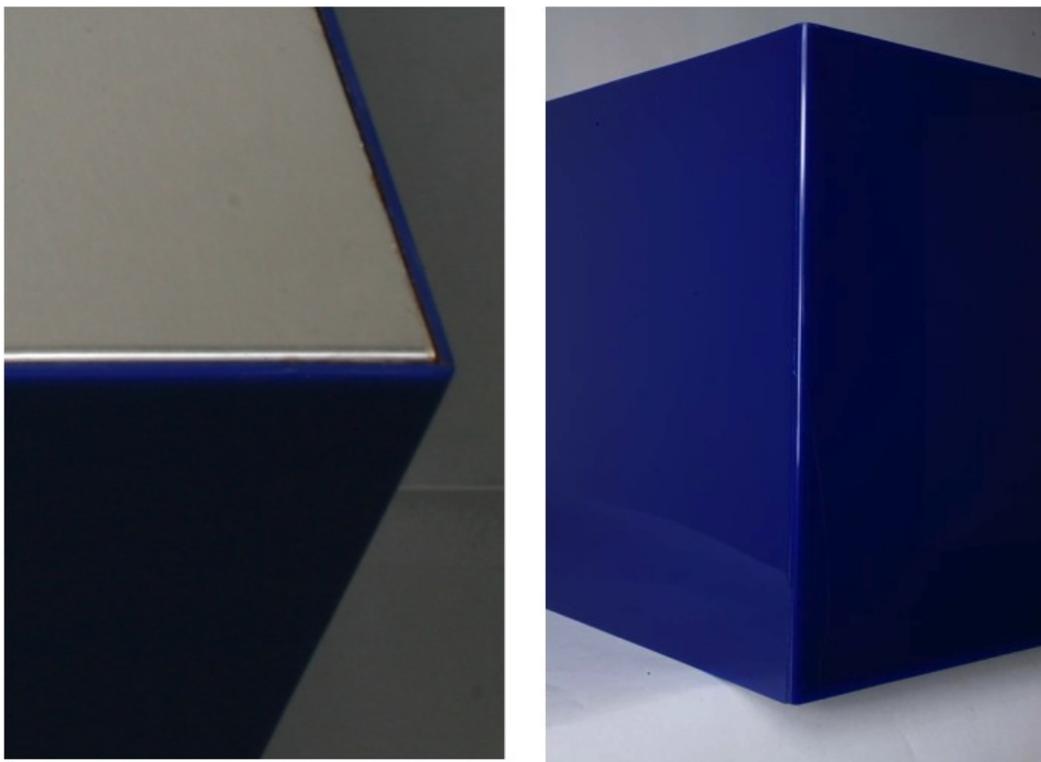


Fig. 3. Corner of one unit showing the overlap and rounded edge (Photograph by Shelley Smith)

### 3. CONSIDERATIONS BEFORE TREATMENT

There is a long established debate about whether to use contemporary replacement parts in Judd's works or to repair and reuse the original materials. The choice to discard the original materials and to replace them with new materials is based on the perception that Judd's works are industrial fabrications that are easily reproduced. This view disregards the fact that the individual skills of the fabricators and the period hand tools and technology that they used were instrumental in creating the works. Although executed to the highest standards available at the time, the works display specific marks, including subtle imperfections, of the period technology, which, in most cases, no longer exists or is no longer in use. When discussing his work, Judd

stated that high-quality craftsmanship of the period is an essential feature of his works (Coplans 1971). Additionally, Judd was not a conceptual artist; his works are unique and there are no known records in which he authorized replicas of his works, or exhibition copies.

The removal of the acrylic sheets from Judd's wrap-around stacks has been performed many times. In the currently practiced method, the original sheets are destroyed during removal and replaced with contemporary "equivalents." The generally held view is that retaining the original acrylic sheets is unfeasible or impractical. Many, including the original fabricator and an assistant to Judd, hold this opinion. However, up until now, no one has proved that safe removal and reclamation of the original acrylic sheets is possible. Reexamining current assumptions and following the logic and ethics of conservation principles, the authors embarked on a treatment to preserve the authenticity of these works by retaining and reusing the original acrylic sheets.

A number of observations supported the authors' ambitious aim. The nominal thickness of contemporary acrylic sheets is 1/8 in., or 0.125 in. The acrylic used on *Untitled 1977* is slightly thicker, varying between 0.121 and 0.143 in. Commonly available 1/8 in. thick acrylic, measures less than 1/8 of an inch; it is typically only 0.116 in. and, in contrast with the sheets on the artwork, its thickness is more uniform.

While such differences may be ignored considering the scale of the overall object, they lead to the supposition that the original sheets are cell cast, one of three ways of producing acrylics. Cell-cast acrylic has superior hardness and machinability, and today its production is very rare (Cell Casting 2010; Evonik 2010). Acrylic that is cell cast, when compared to the currently available continuous cast and extruded types, varies in thickness and exhibits prominent shrinkage marks. During inspection of the *Untitled 1977*, such marks were noticed on the original sheets, along with visible variations in the thickness of the acrylic. The purchase order for *Untitled 1977* specifies the color of the acrylic but not its manufacturing technique. For Judd, omitting such a detail is not unusual as purchase orders for his works often did not include a number of important details concerning the fabrication of his artworks, such as the spacing, type, and number of bolts. Molecular weight analysis would be the most effective method for identifying the manufacturing technique of the acrylic; however, this method is destructive and, therefore, has not been pursued. Although the type of acrylic sheet used for *Untitled 1977* cannot be unequivocally determined without damaging the artwork, the authors, based on their observations of the artwork, deduced that cell cast grade of blue 606-0 TL was likely used. Currently, the *only* indisputable evidence of the type of acrylic sheet used for *Untitled 1977* is the object itself. Moreover, the authors have come to realize that, to date, no information concerning the types of acrylics used for making Judd's works is available.

Before executing the treatment, the following preparations were undertaken. The authors interviewed the son and successor of the original fabricator of *Untitled 1977* to gather information about the fabrication method for fitting the acrylic sheets to the metal structures.<sup>3</sup> Also, at the planning stage of treatment, the reversibility of the adhesive for securing the acrylic to the metal was carefully considered. Detachment of the original adhesive indicated that the acrylic sheets could potentially be removed without harm. Because acrylics are highly sensitive to solvents, the use of solvents would be avoided, and the original contact cement would be preferred for its initial water solubility.

A crack running nearly the full height of one unit brought into question the feasibility of removing damaged acrylic sheets without causing further damage. In preparation, the authors ordered a reproduction of cell cast 606-0 TL acrylic, should their attempt at removing the damaged original fail. The special order, which was a very close match to the thickness range of

the 1977 original, was cut to size and delivered before the treatment started.<sup>4</sup> The authors later learned that the company that produced the cell cast, Evonik Cyro, will phase out its cell cast acrylics in the United States by the end of 2011 (Evonik 2010).

#### 4. TREATMENT

To prepare for the treatment, the exact configuration of acrylic panels on each unit was carefully marked so that the panels could later be re-adhered in the original configuration. Before removing the Plexiglas on a particular unit, the authors first located the acrylic sheet that had the poorest adhesion. The unit was then positioned so that the sheet to be detached was in vertical position. This allowed gravity to help facilitate the detachment process. Then the unit was placed on a custom-made wooden frame and carefully clamped in place to prevent the unit from moving while the acrylic panel was removed.



Fig. 4. Close-up of acrylic sheet cut separate from the steel support (Photograph by Eleonora Nagy)

The acrylic panels were removed using a variety of tools, including custom-made cutting wires, typically used by potters for slicing through wet clay, as well as delicate, fine-toothed

Japanese saws. First, the authors used a thin, 1 in. long fine-toothed cutting blade with a wooden handle to probe the thin layer of the original adhesive between the acrylic and the metal. This tool, adopted from pottery making, earned the nickname “explorer” during the project. Afterward various cutting wires and Japanese Ryoba saws were used, which proved to be the most effective tools for detachment because they were thin enough to cut through the adhesive layer without cutting into or abrading the acrylic or metal (fig. 4). Furthermore, the wire and saw provided the necessary friction for sawing through the adhesive, which tended to be crumbly and brittle. Occasional squirts of water into the gap between the Plexiglas and the metal softened the glue and accelerated the process.

In an effort to prevent an accidental fall and breakage of the panel after detachment, an ACE rubberized bandage was wrapped around the unit (fig. 5). The bandage gently held the acrylic in place, while permitting it to slide slowly and safely to the floor. A piece of soft foam was placed under the acrylic sheet being removed to mitigate a sudden fall. The panels were removed one-by-one to prevent damage. The unit was repositioned on the frame for detachment of each panel.



Fig. 5. Detached acrylic sheet on the side of one unit. The unit is clamped to the Volara covered custom-made wooden frame. Note: the ACE rubberized bandage is wrapped around the unit; the foam under the acrylic sheet; and the tools used for detachment on the foam. (Photograph by Eleonora Nagy)

Glue residue on the verso of the detached acrylic sheets was mechanically cleaned using scalpels. The brittle glue separated readily from the surface of the acrylic sheets (fig. 6). Adhesive residue on the sides and fronts of the metal units was removed using a Carbopol formulated acetone gel.<sup>5</sup> A thick layer of acetone gel was applied by brush to the glue residue. The area was then covered with Mylar to reduce evaporation of the solvent. The gel was left on the glue residue for 30 minutes to one hour, depending on the thickness of the glue, and then removed with a combination of scalpels and metal scrapers (figs. 7, 8).

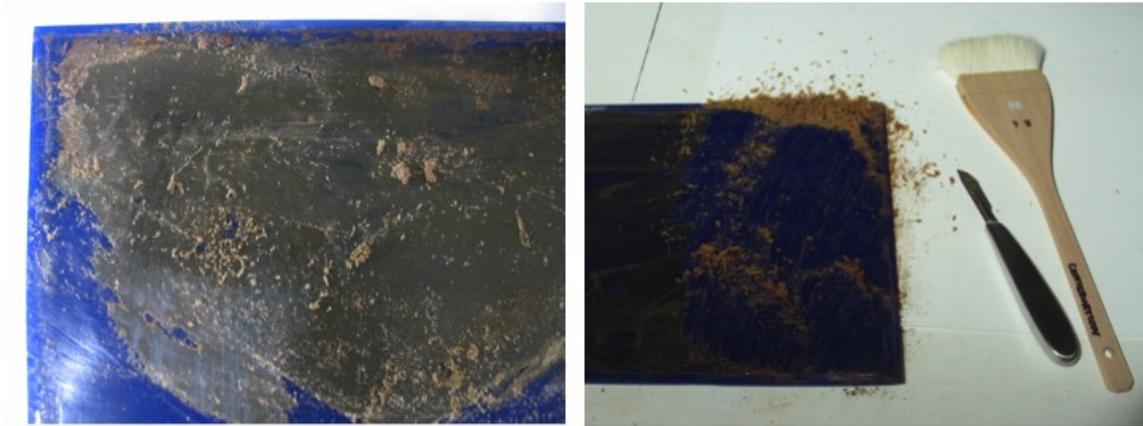


Fig. 6. Verso of a detached acrylic sheet before (left) and after (right) adhesive removal (Photograph by Eleonora Nagy)



Fig. 7. Adhesive residue with acetone gel application on the metal unit (Photograph by Eleonora Nagy)

The cleaned units were then placed on the wooden frames in order to re-adhere the original acrylic sheets. Once the units were in position, the original side panels were clamped onto the respective metal unit (fig. 9). This was done without using adhesive so that the front panels could be properly placed. This method ensured proper alignment of the acrylic sheets on the metal support, especially at the left and right corners of the front sheet. Leaving both side panels clamped to the metal support, the front sheet was carefully removed and adhered using the gel version of Weldwood Contact Cement, the adhesive originally used for fabrication. After interviewing the fabricator, the authors learned that the Contact Cement originally used resulted

in slippage of the acrylic sheets, as well as adhesive seepage during clamping, and so the higher viscosity gel version was used instead. The adhesive was evenly applied using a spreader, and the panel was clamped in position. After proper adhesion of the acrylic sheet on the front, the sides of the unit were glued one at a time. To avoid adhesive seepage, the position of the sheet being adhered always remained horizontal. To ensure even pressure on the acrylic panels during adhesion, full-size custom-made padded wooden panels were clamped onto each panel (fig. 10). Unexpected developments during treatment included a significantly longer setting time for the glue than the producer specified. Instead of the described two to three days, occasionally up to six days were necessary for the adhesive to set. The reason for this phenomenon remained unclear to the authors; however, it is suspected that high humidity might have been a contributing factor.

Although, theoretically, the metal surfaces of these rectilinear units are perfectly planar and precise in dimensions, technical attributes of the period machinery, such as bending of the metal sheets with a hand brake during fabrication, resulted in minute recesses and discrepancies in the plane and size of metal surfaces. Occasional indentations and gaps measuring up to 1–2 mm between the acrylic and the metal remained unnoticed before adhesion. The Contact Cement did not properly fill these indentations; however, adding 3M Glass Bubbles to the contact cement solved the problem. A thin plastic tube was attached to the tip of a hypodermic syringe (in place of the needle) and the mixture was squirted into the gaps. For similar projects, the authors recommend adding up to  $\frac{1}{4}$  Glass Bubbles to the gel adhesive, volume to volume.

Among various challenges of the treatment was a major, disfiguring crack in the acrylic on the front of one of the units, which will be briefly described. Although the crack stretched across the front panel, it did not cause the front and side acrylic sheets to separate. The line of adhesion between the acrylic and the metal was cut, and the front and side sheets were separated as one right-angle unit. A mock-up of the metal unit was made, and the acrylic was transferred to the mock-up. A special right-angle frame was then used to allow access to the verso of the acrylic for cleaning. The crack was repaired and reinforced from the back. The repaired acrylic was then transferred from the mock-up unit and re-adhered on the metal support (fig. 11).

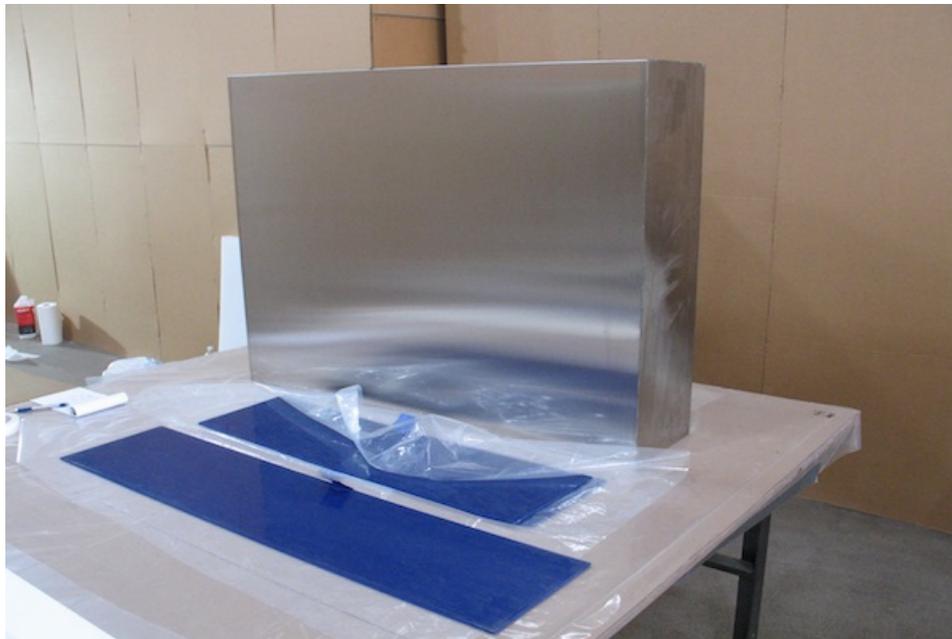


Fig. 8. Cleaned metal unit and acrylic sheets ready for re-attachment (Photograph by Eleonora Nagy)



Fig. 9. Dry fitting of the acrylic sheets, with the front facing up (Photograph by Shelley Smith)



Fig. 10. Units clamped for adhesive setting. Note the full-size, Volara-padded wooden panels on the top of each unit. (Photograph by Eleonora Nagy)



Fig. 11. Crack on the front of and corner of unit 2. The crack starts at the top front and turns into the glue-line on the lower half of the corner. Before and after treatment. (Photograph by Shelley Smith)

## 5. CONCLUSION

The treatment of *Untitled 1977* was a success, and the wrap-around stack was re-installed in its original, prominent location in Judd's residence. Successful repair of the large crack proved that even severely damaged acrylic can be saved with this new method. The treatment is reversible and, compared to traditional approaches, requires no significant allocation of additional labor or funds (Figs. 12 and 13). This case study illustrates the importance of periodical re-evaluation of all customary treatment practices on works of art.

## ACKNOWLEDGEMENTS

The authors would like to thank the following individuals who munificently contributed to this project: Kendra Dacey, conservation intern; Randy Sanchez, facilities manager and builder of all of the custom supports and mock-ups; and Craig Rember, collections manager and chief of Marfa operations, who also assisted in the project. We would also like to thank the Donald Judd Foundation for their generous support.



Fig. 12. *Untitled 1977*, re-installation  
(Photograph by Shelley Smith)



Fig. 13. *Untitled 1977* after treatment  
(Photograph by Shelley Smith)

## NOTES

1. The word *assembled* here refers to objects that are fit together by bolts or screws, and readily disassembled; in contrast to works that are more permanently joined by means of soldering, welding, adhering, etc.

2. “DSS104” refers to the identification of this work of art used in: Smith, B. 1975. *Donald Judd: A Catalogue of the Exhibition at the National Gallery of Canada, Ottawa, May 24–July 6, 1975: Catalogue Raisonné of Paintings, Objects, and Wood Blocks, 1960–74*, National Gallery of Canada, Ottawa. # 104.

3. Personal communication between Bernstein and Eleonora Nagy took place in 2004. Bernstein is the son and successor of Bernstein Brothers, Inc. Bernstein Brothers Sheet Metal Specialties, Inc. fabricated an overwhelming proportion of Judd’s works made of metal, including *Untitled 1977*, the topic of this paper.

4. San Diego Plastics, Inc. 2220 McKinley Avenue, National City, California, 91950

5. The Carbopol formulated acetone gel was mixed following the “generic polar solvent” formula described by: Rivers, S., and Umney, N. 2003. *Conservation of Furniture*. Oxford, UK: Butterworth Heinemann. 556–557.

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Coplans, J. 1971. An interview with Don Judd by John Coplans. *Artforum* (June):40–50.

Evonik. 2010. Evonik Cyro streamlines Sanford acrylic sheet production. Sanford, Maine. June 24, 2010. <http://corporate.evonik.com/en/media/archive/pages/news-details.aspx?newsid=12917> (accessed 11/07/2011).

## SOURCES OF MATERIALS

### Ryoba Saw

Harima or Kungaro brands from Japan, or  
Tools for Working Wood  
32 33<sup>rd</sup> St., 5<sup>th</sup> Fl.  
Brooklyn, NY 11232  
Tel: (800) 426-4613  
[www.toolsforworkingwood.com](http://www.toolsforworkingwood.com)

### 3M Glass Bubbles K1

[http://solutions.3m.com/wps/portal/3M/en\\_US/Oil-Gas/Home/Prod\\_Info/Prod\\_Catalog/?nid=M819LFMJR7beMV4WNM35Vfgl](http://solutions.3m.com/wps/portal/3M/en_US/Oil-Gas/Home/Prod_Info/Prod_Catalog/?nid=M819LFMJR7beMV4WNM35Vfgl)

### ACE Rubberized Bandage

Local pharmacy

### Weldwood Contact Cement

DAP Weldwood Gel Formula Contact Cement  
[www.dap.com/products.aspx?SubcatID=8](http://www.dap.com/products.aspx?SubcatID=8)

### Pottery cutting wires and various pottery tools

Pearl Fine Art Suppliers  
<http://www.pearlpaint.com/>

### Carbopol

BFGoodrich Company  
Specialty Polymers & Chemicals Division  
9911 Brecksville Rd.  
Brecksville, OH 44141-3247  
Tel: (800) 331-1144

ELEONORA E. NAGY holds a Master's Degree in Fine Art and in Art Conservation and specializes in the treatment of three-dimensional modern and contemporary art. After decades of involvement with institutions that include the Canadian Conservation Institute and the Solomon R. Guggenheim Museum, she recently assumed the position of the first conservator of three-dimensional art at the Whitney Museum of American Art. She is also the principal conservator and owner of Modern Sculpture Conservation, an LLC with notable institutional and private clientele in the United States and Europe. An acknowledged expert on the conservation of works by Donald Judd, she is the founding member of the Conservation Committee of the Donald Judd Foundation. Nagy's interests include pioneer research in industrial processes and materials used for making modern art, and, in particular, minimalist art and modern metals, topics on which she has published extensively. Address: 59 Walker St., New York, NY. 10013. Tel and fax: 212-226-1431. E-mail: [eleonora@msconservation.net](mailto:eleonora@msconservation.net) or [eleonora\\_nagy@whitney.org](mailto:eleonora_nagy@whitney.org)

BETTINA LANDGREBE received her training in the conservation of sculpture, objects, and paintings in Germany and at the Academy of Fine Arts in Vienna between 1975 and 1981. She served as the Judd Foundation's first conservator from 1996 to 2000. After returning to Europe, she worked as the conservator for paintings, sculpture, and contemporary art for the museum Kunsthalle in Bremen, Germany. Since 2007, she has worked as the Chinati Foundations's conservator in Marfa, TX. Address: The Chinati Foundation, 1 Cavalry Row, PO Box 1135, Marfa, TX. 79843. Tel: (432) 729-4772. Fax: (432) 729-4597. E-mail: [landgrebe@chinati.org](mailto:landgrebe@chinati.org)

SHELLEY M. SMITH received her Master's Degree in Art Conservation from Queen's University in Kingston, Ontario in 2003. Most recently she served as the Judd Foundation's conservator before taking her current position as objects conservator at the Menil Collection in Houston, TX. Address: The Menil Collection, 1515 Sul Ross St., Houston, TX. 77006. Tel: (713) 525-9464. Fax: (713) 525-9444. E-mail: [ssmith@menil.org](mailto:ssmith@menil.org)