Artist Projects at Holographics North

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Abstract. The New York Times has declared the concept of holography in art as "laughably dated". And yet fine art remains one of the most durable applications of the medium. Holographics North Inc. has produced work for over 50 artists in 28 years. In many cases, new techniques and systems were required in order to implement the client's vision. The technical and conceptual challenges involved in several of these projects will be discussed, including photos of the work and the systems built to produce it. Among the artists addressed will be James Turrell, Michael Snow, Frank Stella, Michael Hayden, Harriet Casdin-Silver and Chris Levine.

Holographics North Inc (HNI) owns the basement of an old school building in Burlington, Vermont (Figure 1). It is 6,000 square feet with 10 foot ceilings and 3 foot stone foundation walls. The building is now a commercial condominium and the regulations require that no one can produce substantial noise or vibration. We are also located on a quiet, residential street.

Nevertheless it has taken considerable work to render the space into its current configuration. Here, for instance (figure 2), is the asbestos-clad boiler that was removed to make room for our showroom. And we're small. Our staff have varied over the years between 9 people and 1. But in that modest space, with that tiny staff, we have generated over a thousand large holograms for a variety of clients, in both commercial and fine arts realms (Figure 3). Most of those projects required new procedures and equipment, and it is some of those that I shall address, in particular the artist projects. If you want to learn your limitations, work for an artist.
Michael Sowdon of Fringe Research approached me in 1985 to produce a series of large holograms for Canadian artist Michael Snow, to be shown at Expo '86 in Vancouver. Building on the success of his Walking Woman series at the Montreal Expo '67, Snow had been given Vancouver's original railroad engine house to fill with art. He chose to show exclusively holograms, hopefully making the work accessible for all viewers - parents, children, art critics etc.

We quickly determined that our 5x10 foot table was too small. And we abandoned the staggered object beams required by our 25mw HeNe, which had no etalon. As Steve Benton put it, we "took the argon plunge," and also poured the 12x22 foot, floor level isolation table that we still use today. It is a 14 inch thick concrete slab, rigidly connected to four sono tube legs, each surrounded by a larger, open PVC sleeve (Figures 4, 5 & 6). The slab does not float, but makes no contact with the ground until about 12 feet down, where the legs hit a layer of glacial till. There is also a space between the slab and the surrounding floor. So we are isolated from the building, and Burlington is a quiet city.
Figure 7. The ice pack to support the concrete slab while it set.

Figure 8. The finished 12x22 foot table, with (l. to r.) Michael Sowdon, Michael Snow and John Perry.

Ice supported the 25 ton slab while it set, producing an air space beneath (Figures 7 & 8).

The Expo 86 exhibition was a spectacular success, representing all modes and sizes of holography, and a wide spectrum of subjects, all displayed in a dazzling environment. The series entitled Still Life in 8 Calls (Figure 9), later to be shown in several galleries, including at MIT, garnered particular attention. Eight 24x32 inch holograms showed the same plywood tabletop with a lamp, telephone, coffee cup, car keys and pencil on top. The expo theme was transportation and communication. "It's for you" was written on the corner of each tabletop in pencil. And each hologram showed the items in different styles of abstraction - melted down, exploded, cubist etc. Displayed in a straight line, the holograms were surrounded by four actual table legs with a chair in front of each.

Figure 9. Still Life in 8 Calls; the table legs and chairs; Call #8 - exploded (not pulsed).

Over 50 holograms for the exhibition were produced at 3 labs: HNI, Fringe Research and Laboratoire de L’holographie de Paris. A few are shown in Figures 10a and b.

Figure 10a. 1 of 3 HNI 3x5 foot landscapes; reflection holograms by Fringe Research;
The next year David Katzive asked us to render a Frank Stella maquette as a hologram for an exhibition in Cleveland, marking the 100th anniversary of the Michelson-Morley experiment.

Production of the 3x3 foot piece was straightforward. But color seemed critical in the original, and was of course not recorded in the single slit rainbow hologram (Figures 11 & 12). We were not in a position back then to produce true color, and I still discourage it today. There are many small holograms with strong, vibrant true color, but I have yet to see a large one. Nevertheless, there are those occasions when it should be attempted, and this was perhaps one of them.

The topic of Colorful brings us to the late Harriet Casdin-Silver, who was awarded a grant in 1999 to produce an exhibition for Boston's millennium first night. Her brilliant concept involved large holographic portraits of people who had lived in Boston for most of the century. Each would be accompanied by a soundtrack of the subject telling anecdotes from his or her life. Sound domes in front of the holograms focused the monologues to individual viewer locations. The exhibition was entitled *A Celebration of Aging* (Figure 13), and production again went smoothly.

Although the holograms were shown for only 2 days at Boston's Hynes Center, they were a major success. The Boston Globe loved them. Even the New York Times liked them, but mistakenly suggested that the holograms were made in Harriet’s Boston studio. And that was our only serious problem with this project, as well as others. Like Harriet, many artists employ fabricators. I urge the artists to take credit for their artwork, negotiate with their fabricators whether to grant them credit, but
not pretend that they fabricated the work themselves. This belittles the medium and everyone involved, including their audience. It is unfortunately all too common in holography. I asked Harriet, and then the Arts editor for a printed correction, but was denied.

Figure 13. A Celebration of Aging: installation and 6 of the 9 images.

Figure 14. Face to Face, 16x20 inches.

Figure 15. The 3x5 foot Fort Point Artists hologram on Art New England's cover.

Celebration was shown several more times in various New England venues, with well deserved positive reviews. We made many more portraits with Harriet in the following years (Figures 14 and 15). She had a particular gift for working with her subjects, and her talents will be missed.

Passing through O'Hare airport, you may have encountered the Neon Tunnel, designed by artist Michael Hayden. He asked us in 2002 to produce a series of outdoor holograms for the Charles M. Schulz Museum in Santa Rosa, California. They were to show Snoopy and Woodstock playing hockey on a 3-foot diameter birdbath (Figures 16 and 17). As you walked around it, you would discover five different images, sticking straight up about 8 inches toward you, like flying over a miniature New York City. We decided on first generation, split-beam, real-image reflection pieces, lit from directly above, for a wide, unshadowed viewing angle.

Figure 16. 1 of 5 holograms for the birdbath.

Figure 17. Installation of the holograms.
Production was not difficult, but the operative word of course is "outdoor". We usually discourage this, for a host of reasons: rain, sun, bright ambient light etc. Our first plan, luckily suggested by Hayden himself, was to encase the wedge-shaped holograms in a kind of circular acrylic coffin. We packed silica bags inside under dry conditions and prepared to seal it up tight, but then realized that it would probably explode in cross-country shipment. We drilled tiny breathing holes with instructions to seal them immediately upon arrival. After four months in a humid San Francisco warehouse, our crate was finally opened and the instructions promptly lost. After another four months baking on-site in the California summer sun, our solar oven was warped beyond recognition. We had apparently achieved 180 F, the annealing temperature of acrylic.

The next attempt involved overcoating each holo-pie slice with waterproof, uv-blocking polyester film, and then loosely covering the entire birdbath surface with glass. Hayden also introduced a roof in the form of Lucy's baseball cap (Figure 18), not only to block much of the sun and rain, but also to house an overhead lamp (Figure 19). The first images were reconstructed with sunlight, but variations in angle made Snoopy and Woodstock lose their balance on the ice. The overcoating worked for several years, but eventually these images also faded (Figure 20).

I know of no successful attempts to embed a holographic display this size in solid resin. Finally we replaced some of them again, with the individual pie-sliced holograms cemented to glass top and bottom. As far as I know, these are holding up well. The film was laminated on the top side with our usual clear, double-sided, cold roll adhesive. Then we cemented the lower side to glass with uv-curing liquid cement. The glass edges were cut to a bevel, creating a pocket in which we could edge-seal the pieces with silicon, probably the weakest link.

Fortunately, Hayden had ordered early on that we make at least 2 backup copies of each hologram along with the original, a precaution I recommend to most clients. In our medium more than most, it is far cheaper to make extra copies when the setup is in place, than to go back later.

In another high profile project, Jeffrey Robb called in 2003, asking if we would be interested in making a holographic portrait of "a member of the royal family" for "a British artist". "And don’t tell anyone," he cautioned. The artist with the commission turned out to be Chris Levine, the family member was Queen Elizabeth II (Figure 21), and the stereogram footage was shot at Buckingham Palace with a rail and digital camera system built by Rob Munday. Being a Colonial, I was not invited, but did later get to hang the queen hologram in Buckingham Palace.

The 1x1.3 meter transfers had to be flawless. But the major challenge was that Chris wanted the image well in front and only in blue - royal blue - a stroke of artistic genius. The size and depth of the image required a white light transmission hologram. But at that time, we required a vertical array of lamps to provide a tall enough viewing field from a “rainbow” hologram lit in single color. An 18 inch tall array at about a 10 feet distance was found to be sufficient (Figure 22).
Her majesty's eyes projected about 32 inches, and the transfer was shot in red. And so the wavelength shift from HeNe red to LED blue caused her majesty to look too wide. The mismatch of reference to illumination beam divergences made it even worse. After several batch processes in Photoshop, we found just the right predistortion of the photo frames. I used the ratio of eye-to-eye distance to hairline-to-chin distance as our guide. Several copies of the hologram have now traveled around England, with a permanent installation on the Island of Jersey. The same photo footage has been used in the years since to produce other portraits, including small embossed versions and large lenticular renditions. These are mostly true color, but personally I far prefer the original LED blue.

Single-color LED illumination was in fact so stunning that it seemed a valuable technique to pursue. And a call from Matt Schreiber in 2004 provided the opportunity. Matt installs James Turrell’s exhibitions around the world, and knew that James was increasingly interested in holography. But he required single color, not rainbows, and not the somewhat muted colors of most reflection work. The transfer sizes would vary from 24x36 to 36x72 inches.

Matt suggested the same concept I was considering at that time, rainbow transfers made from open aperture masters. This provides a tall viewing field when lit in single color, or of course an achromatic image in white light. Furthermore, lamps in different colors can be separated horizontally, to produce several colors of the same image, crossing at the film plane. And these decisions are made upon installation, offering a greater degree of spontaneity.

In stereogram work, this seemed simple enough - lengthen the stereogram exposure slit from the usual few centimeters to at least 16 inches. But the mastering screen must be focused accurately onto the transfer plane, to keep horizontal lines sharp from that tall, open aperture master.

This presented problems. First, we had built our stereogram mastering camera in the abandoned, 5x30 foot heat exchange space of the original 19th century, coal-fired furnace of our building. It wasn't wide enough to accommodate the longer exposure slit and the expanded reference beam. So the whole rig had to be moved out into the open, and reconfigured. This took a few months, and then production began, along with more problems.
For several years we had used a 4x60 inch liquid cylindrical lens to converge the illumination beam across the length of the master for transfer exposures. This also had to be fabricated again, in a 16 inch width, requiring 34 liters of mineral oil (Figure 23). But it was mistakenly made with birefringent polycarbonate surfaces. A polarizing filter quickly confirmed that it had to be remade with acrylic, which we did.

Unfortunately, the transfer images were still not sharp, and we eventually identified astigmatism as the culprit. We needed to converge the H1 illumination beam in both dimensions, to fully focus the H1 screen onto the H2 plane. This is of course not necessary for a slit master, since there is no vertical parallax. So we built another 16x60 inch liquid lens curved in the other direction, to be used in series with the first. Images were now indeed reasonably sharp in both dimensions.

The Turrell transfers were mostly 6 feet tall, made from 16hx44w inch masters. And this posed an even more difficult problem. The master illumination beam struck the top of the transfer film directly (Figure 24). Masking it between the master and transfer did not work well. We eventually learned to insert a knife-edge into the unspread reference beam, before the spatial filter. This produced a soft shadow in the reference beam, preventing the direct object beam from recording.

Next, internal reflections within the liquid lenses caused another, secondary object beam to fall across the transfer just above the center line of the image (Figure 25). After several weeks, we eventually found a way to baffle that beam after the second surface of the last big liquid lens. Each of the 40 transfers required careful re-adjustment of all these baffles.

Our biggest challenge, however, was none of the above. It was simply to produce perfect, unblemished 38x72 inch transfers on film, something that I usually claim is simply not possible. This required a massive cleanup of the labs and refiguring of almost every step in our processes. It also reduced our success rate drastically. With each shot taking most of a full day, that was costly.

Eventually the 40 large holograms were successfully completed, laminated to 1/2" acrylic, framed at Schreiber's studio in Florida and finally delivered to Pace Gallery in New York. They have now been shown in several Pace Gallery exhibitions (Figures 26 and 27).

Predictably, the New York Times panned the holograms on Sept. 18, 2009, stating that "The idea of using holograms in art seems laughably dated or, at the very least, kitschy." And yet the public seemed to love them, judging by the response at the openings, and by the multitude of amateur photos to be found online. Perhaps we should yet again question the value of journalistic criticism.
But the Turrell work suggests a more important topic for consideration: is there perfection, not only in holograms, but in anything? Should clients, art or commercial, expect it? I would argue no, there is no perfection, and there in fact should be no perfection. As the Navajo weavers would say, it traps our souls in our work. But then what degree of imperfection is acceptable? Is hand-made work in a different category from machine-made, large different from small, simple different from complex? Surely the answers depend upon the application. But they are poorly understood.

HNI's large hologram on display in the ISDH exhibition, for instance, has flaws. Does anyone care? Can we liken them to Navajo Spirit Lines? Should they have been “fixed”? I can’t say, but for better or worse, we keep trying to chase them away. And in our medium, that is difficult.

*Photo credits: John Perry, Kevin Eaton, Pace Gallery, Todd Gieg, unknown from web.*