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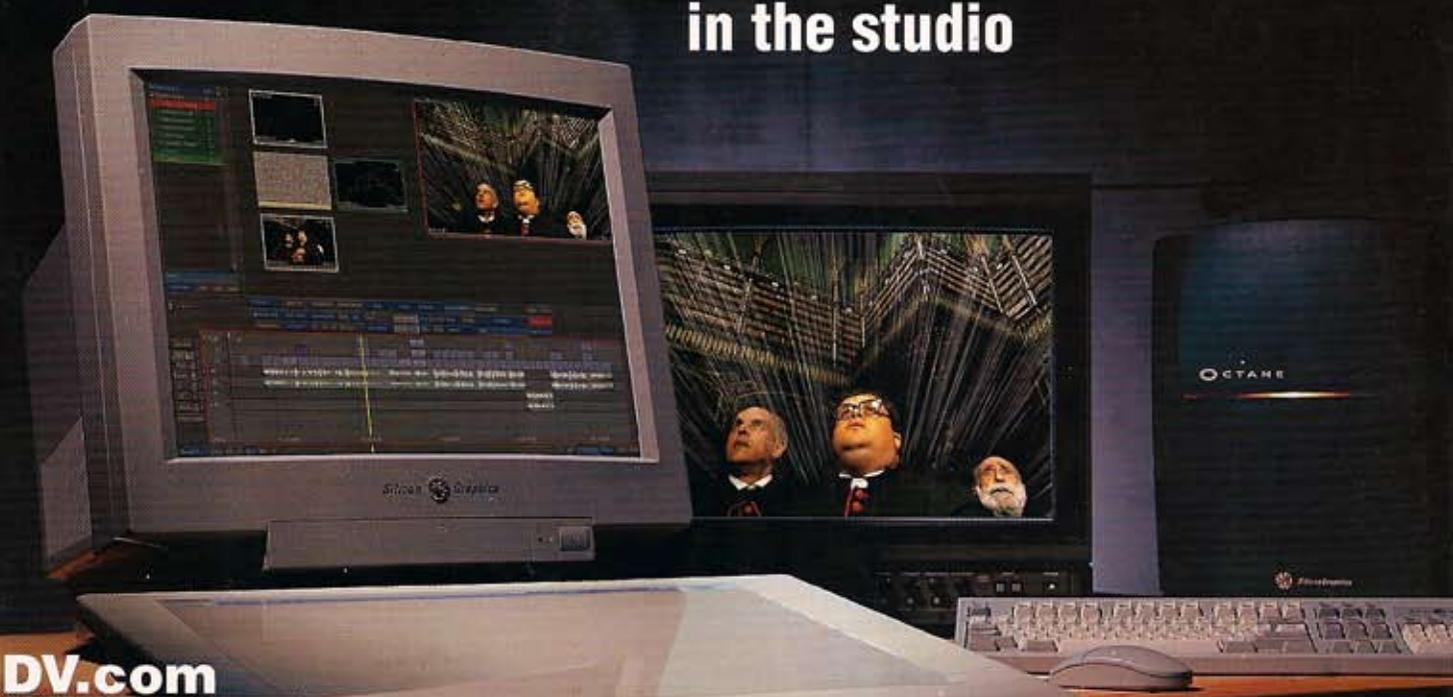
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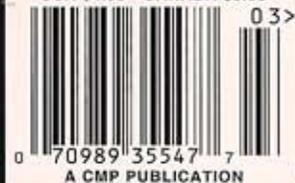
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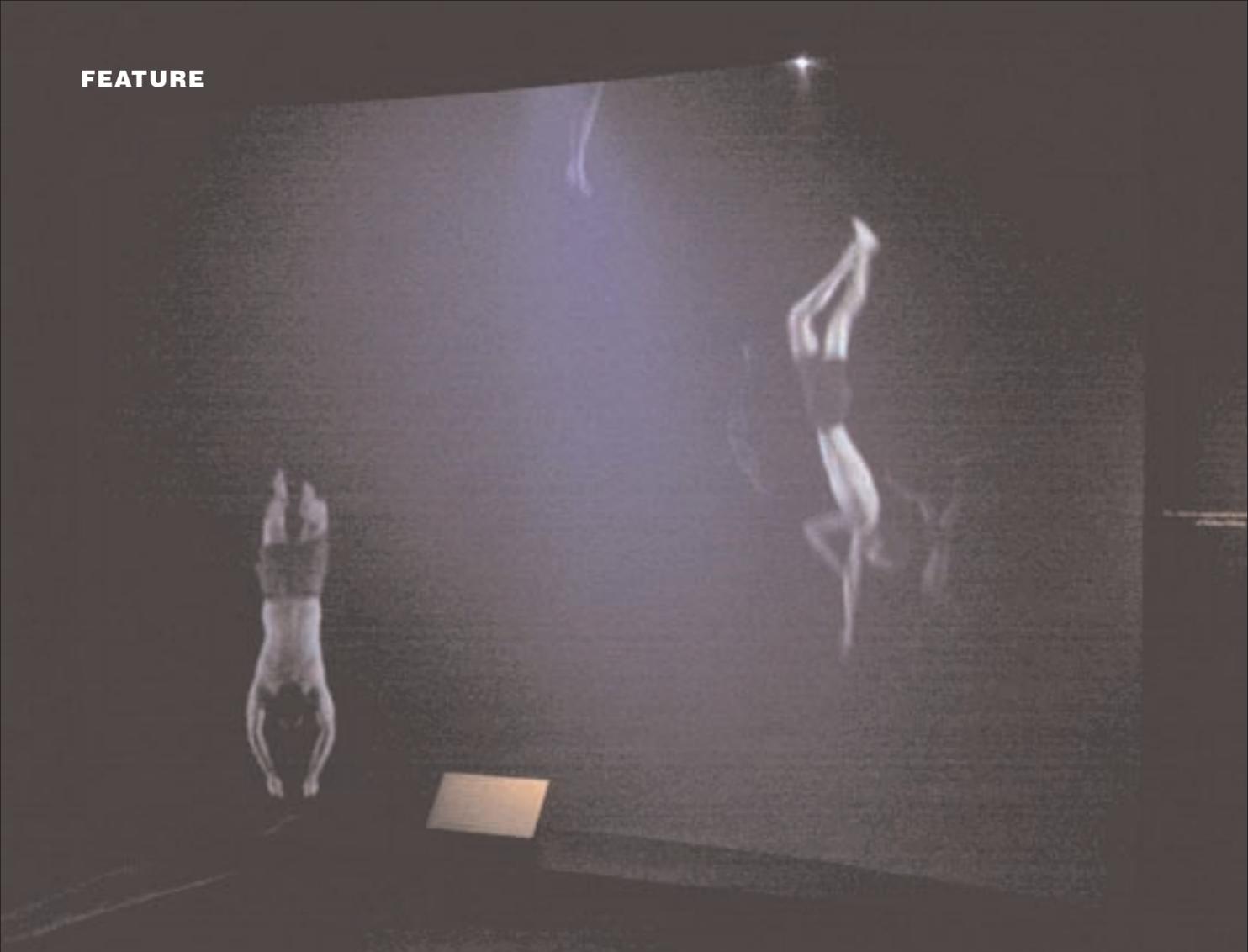
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A CMP PUBLICATION

Case Study: Underwater HD



Video projected onto two scrims sets the stage for the Pearls exhibit.

DIVING FOR HD PEARLS

The creation of an HD video installation for the American Museum of Natural History.

BY THOMAS J. STRODEL

PHOTOGRAPHS BY MINDY WEISBERGER,
AMERICAN MUSEUM OF NATURAL HISTORY

I recently produced a high-definition video installation with Air Sea Land Productions for the Pearls exhibition at New York City's American Museum of Natural History (www.amnh.com).

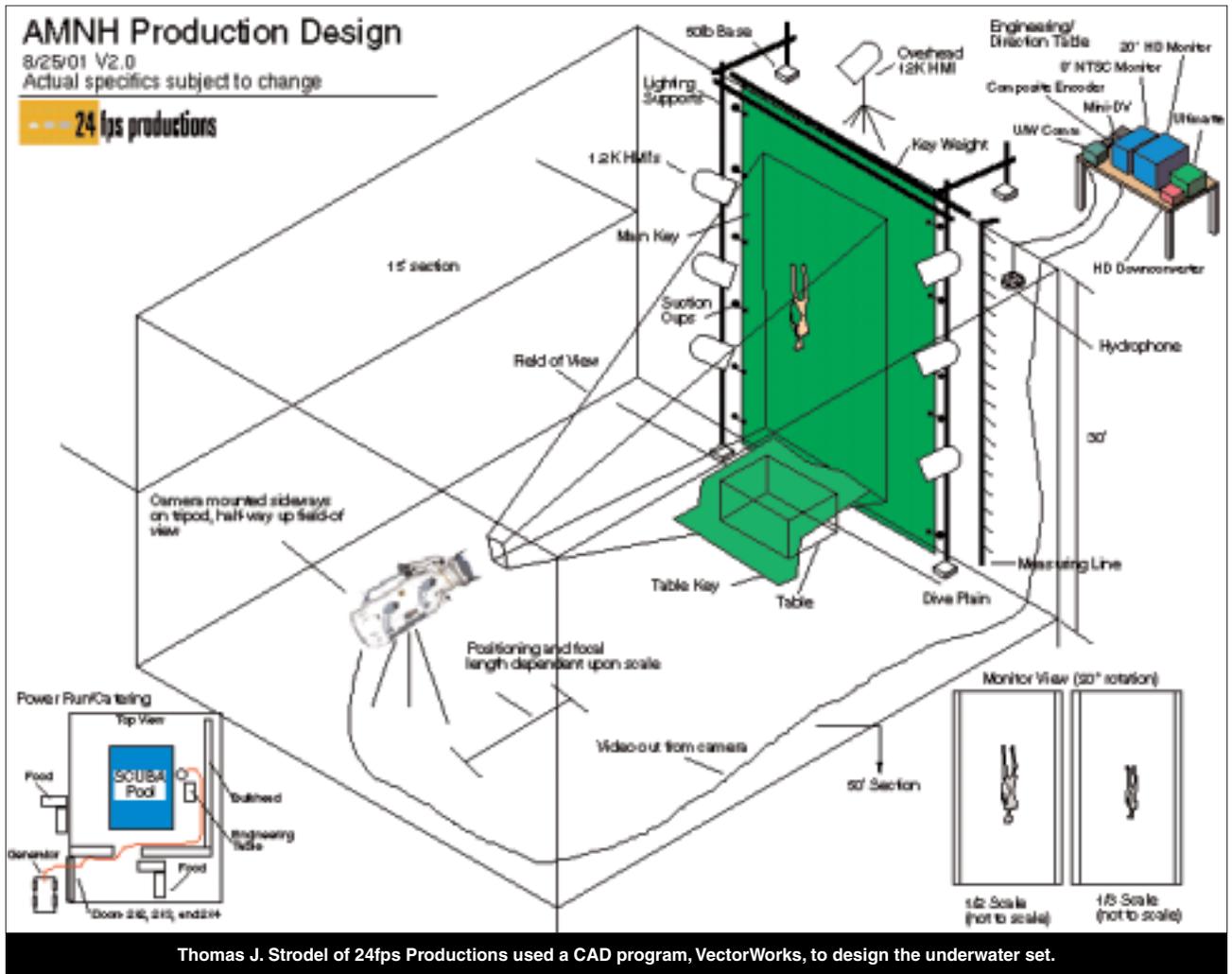
The installation at the exhibition's entrance sets a surreal and meditative mood and plays up a stereotype that is purposely disproved in the remainder of the exhibit. In the installation, pearl divers appear to descend and ascend languidly through water. Through video projection, visitors feel immersed with the divers.

To create the immersion illusion, we had to follow strict projection requirements. Two large, rectangular, translucent scrims hang at the entrance, perpendicular with the floor. One scrim hangs about 18 feet behind the other. Projectors located above play the looped videos onto the scrims.

Visitors primarily see the closest scrim. But because the scrims are translucent, they see through the first to the second scrim and its projected video, adding a sense of depth to the experience. Video spills through and around the scrims and hits the floor and visitors. We iced the visual cake through a focused lighting scheme and soothing underwater natural sound.

But I'm getting ahead of myself. Before we could project the video, we had to create the video.

Because the scrims hang at different distances from the viewer and we wanted the divers to appear lifelike, we needed two versions of the video—one at



Thomas J. Strodel of 24fps Productions used a CAD program, VectorWorks, to design the underwater set.

one-half scale, and another at one-third scale. A five-foot-tall diver appears two-and-a-half-feet tall at one-half scale, and about one-and-a-half-feet tall at one-third scale. Using these two scales greatly adds to the illusion of depth.

We considered several possible scenarios for creating the video and conducted a few trials to work out some of the technical issues. Early on, we decided we would need to shoot the video in a pool—a very deep pool. To represent the required one-half and one-third scales accurately, we would need a pool that was at least 30 feet deep.

To make the divers appear to swim down the water column against the darkly lighted scrim, we would need to key out the shoot's background in post, so we knew we would have to use a very deep pool where we could control light and background. We weren't going to shoot at the local YMCA.

We determined that the scenes should be captured in 1080i HD video. Working with 1920x1080 pixels gave us far greater control in keying, resizing, filtering, and compositing the captured images during postproduction.

Together these needs meant we would mount the first-ever underwater HD chroma key shoot. If, that is, we could find the right pool.

We needed a pool that was deep enough for our technical needs and close enough to our New York base so we could keep within our limited budget and schedule. We settled on a pool built for Montreal's 1976 Olympic games. The indoor diving pool at Montreal's Olympic Stadium has incremental depths of 15, 30, and 50 feet. It proved ideal for the shoot. We rented the pool for two days.

Montreal's thriving video production environment and support services gave

us a great comfort level, as did the close proximity of Amphibico (www.amphibico.com), the manufacturers of the underwater camera housing we would use for the shoot. We contracted production equipment from two local rental facilities, Cinepool (www.cinepool.com) and WF White (www.whites.com).

Planning

We faced a series of challenges that we solved through preproduction trials and tests for the museum. The trials ranged from having Barbie and Ken dolls free dive in a shallow pool as we determined the best color for the keying material to an actual standard-definition trial shoot in the Montreal pool.

The production schedule and budget allowed only two days for the HD shoot, so we had very little room for error and knew that precise planning was critical.

FEATURE DIVING FOR HD PEARLS

Day one of the HD shoot would include setting up and testing, and day two would include the actual shooting and the breaking down.

Added to this tight schedule, we knew we were doing something that hadn't been done before, and we were using specialized equipment foreign to all but the largest production facilities. The pressure was definitely on.

To facilitate production design, I used VectorWorks from Nemetschek (www.nemetschek.net). This let me create a precise picture of the setup well before the shoot. The design team met to determine what we needed, then I plotted everything into an overall production design diagram that detailed the placement of everything from the camera to the catering truck.

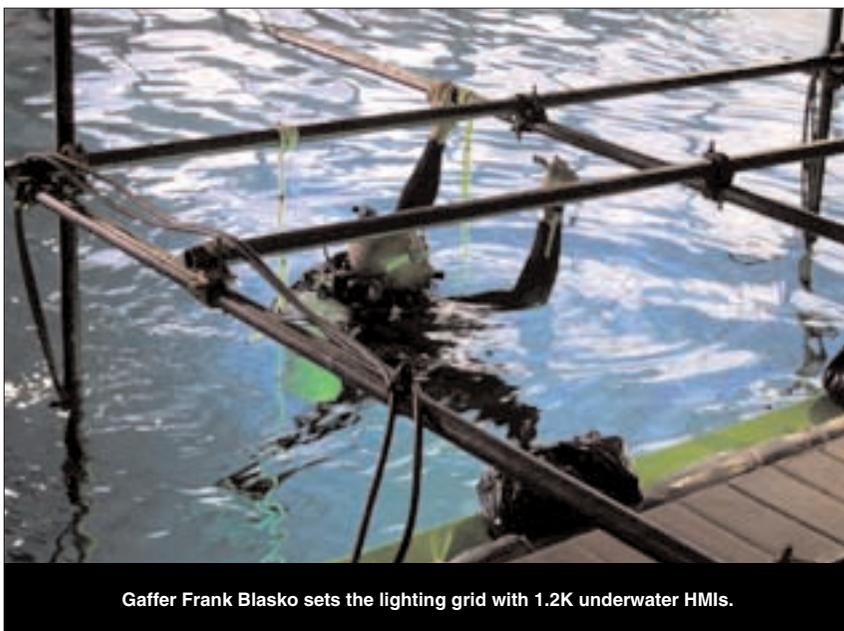
Finding the right talent to play the divers presented a significant challenge. Repetitive free diving to 30 feet is not easy. It requires expert and fit athletes with great lung control and diving ability. We finally found and hired Sonja Fisch and John Murphy to play the role of the divers. Anthony and Eddie Lenzo of Air Sea Land Productions (www.airsealand.com) and Emmanuel Béhier-Migeon, the lifeguard at the pool, also participated in the dives.

The setup

Our production team included Director of Photography Anthony Lenzo, Camera Operator Eddie Lenzo, and



The chroma key screen stood in 30 feet of water and was attached to the pool wall with suction cups.

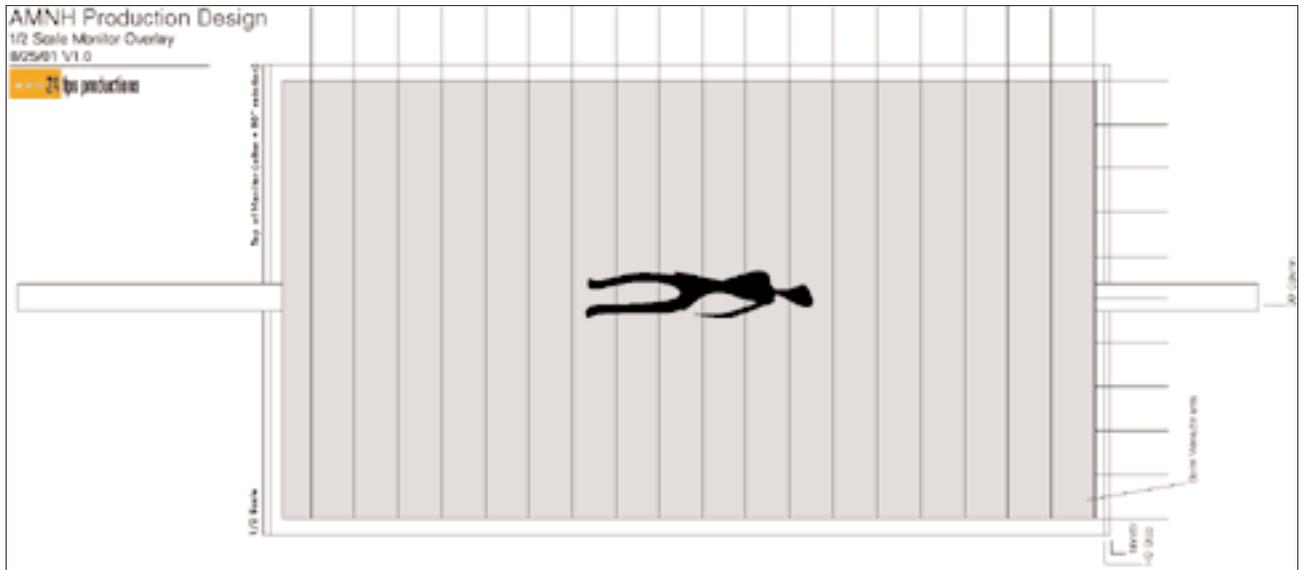


Gaffer Frank Blasko sets the lighting grid with 1.2K underwater HMIs.

Production Assistant Michael Kirsic—all from Air Sea Land. Joining us from the museum were Media Producer Geralyn Abinader, Media Developer Mindy Weisberger, and AV Technician Chris Toy. We all arrived on the site early on day one, and wasted no time constructing the set.

Because we did so much preproduction work and design, everyone knew exactly what needed to be done. We worked together with an incredible sense of camaraderie. We set up a time-lapse camera to capture behind-the-scenes images of our setup. You can see the resulting time-lapse video at DV.com.

To aid communication with the crew working deep in the pool, we installed a hydrophone system that let the divers hear instructions and comments made from the pool's surface. On day two,



Strodel used two CAD overlays, one at one-half scale and another at one-third scale, to help set the camera position for the shoot.

we also used the system to direct and cheer on the talent as they performed their dives.

Lighting

Lighting was the most critical factor in making our shoot a success. To achieve a workable key, the scene had to be lighted evenly. In a studio, this is relatively straightforward because you can easily manipulate lights. But underwater light gets absorbed in extremely short distances. We needed a lot of light.

Guided by our Scuba-clad gaffer, Frank Blasko, we had our key grip, Phillippe Casseus, set about building lighting trusses. The trusses consisted of metal tubing connected together into a grid that would create even lighting on each side of the scene as well as provide a hand-hold for the talent as they prepared for their dives on the surface.

Blasko lit the scene using eight Hydroflex (www.hydroflex.com) SeaPar 1.2K underwater HMIs spaced evenly along the truss with a topside 12K HMI

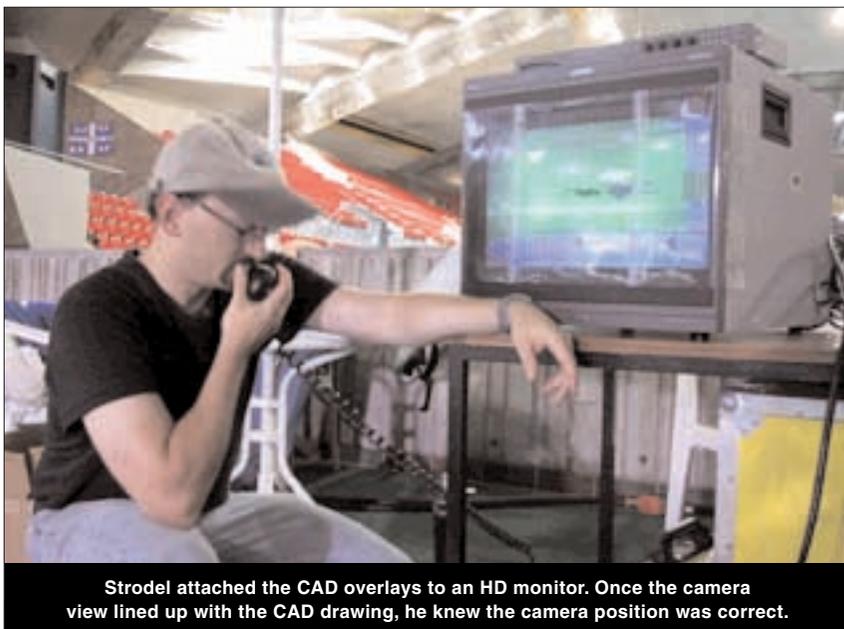
to light the talent along the span of the dive. Blasko coordinated the aim of the SeaPars by monitoring the camera's output topside, then relayed the necessary adjustments through the hydrophone to the crew in the pool.

We knew from our previous SD trial shoot that house power wouldn't be sufficient, so we contracted a 100K generator, more than enough for our needs. That much power near water poses inherent danger, so all runs were GFI (ground fault interrupter) protected. As an added safety measure, we cleared everyone out of the pool prior to firing the lights.

We contracted Bob Kertesz of BlueScreen LLC (www.bluescreen.com) to handle keying during the shoot. He brought the key material—a giant 30x20-foot sheet of Digital Green green-screen from Composite Components Company (www.digitalgreenscreen.com), and a smaller piece of the same material to cover a table constructed at the bottom of the pool. We sunk the key along the pool's 30-foot wall and kept it taut with suction cups attached to the wall.

The camera

We shot with a Sony HDW-F900 HDCAM camcorder housed in Amphibico Amphibicom Marine Video housing. The housing sat on a 90-degree metal bracket so we could capture a vertically tall image. We mounted the camera assembly on



Strodel attached the CAD overlays to an HD monitor. Once the camera view lined up with the CAD drawing, he knew the camera position was correct.

a repurposed jib tripod, then sunk it to the pool's floor. A cable brought the camera's output topside for monitoring.

Later during day one, Amphibico's President Ron Hand and Chief Engineer Val Ranetkins brought an extra camera system to the set as a backup, just in case. We didn't need to use it.

As we positioned the camera, we knew framing would need to match the two scales required for the installation. Using the known measurements of the pool, scene, and HD monitor, I used VectorWorks to create two proportionally scaled transparent overlays, one for the one-half scale and one for the one-third scale, that we taped to the monitor screen.

To bring the scene into scale, we suspended in the pool a weighted rope with markers at every foot. I then talked the camera operator through the camera positioning and zoom setting as we lined up the rope's markings with the grid on the overlay transparency. Once everything matched, we knew we had the correct scale. We followed this process for both scales and placed markers on the pool floor so we could easily reposition between the two scales.

About the Exhibition

The Pearls exhibition at the American Museum of Natural History is the most comprehensive presentation on pearls ever mounted. The exhibition weaves together science, art, literature, history, and fabulous jewelry into the story of pearl-forming mollusks, part of one of the most diverse animal phyla on Earth.

With over 800 objects and almost 500,000 individual pearls, the exhibition brings together historically and culturally significant pieces of pearl jewelry and decorative objects from around the world.

The exhibition opened on October 13, 2001, and runs through April 12, 2002, at the American Museum of Natural History, Central Park West at 79th Street in New York City. You can find out more by visiting the museum's Web site at www.amnh.com. ■

For on-site confidence, Kertesz brought a hardware SD Ultimatte system that could pull a live key and let us

monitor the effect on-site. This monitoring greatly aided us as we positioned the lights and ensured that we returned from the shoot with usable footage.

After some last-minute problems with the lights, we finished setting up and called it a day.

The shoot

We started shooting the morning of day two. The talent queued topside and went through several costume changes during the day. The direction for the talent was simple: Dive down to the table, act as if you're looking for pearl-bearing oysters, then ascend to the surface at a calm, controlled pace. During the day, we logged an incredible 45 dives.

The museum's Abinader, Weisberger, and Toy reviewed the dives on a miniDV tape that had recorded the Ultimatte's output and preselected the best dives to use in post.

The shoot wrapped on time and the breakdown went quickly. The only hiccup was rinsing and drying the parachute-size key. That took quite some time. Then we were done in Montreal.

Postproduction

After the shoot, Christy MacKarrell, systems administrator for the museum, keyed out the green background using the Piranha HD Visual Effects System (www.ifx.com). Then Weisberger used Adobe After Effects (www.adobe.com) to separate the individual dives and create a new composite. Each of the two final videos show several divers composited together. The video runs in loops around 90 seconds each.

David Clinard, lighting designer for the museum's exhibition department, worked with Abinader to give the installation a blue, underwater effect, adding to the illusion that the visitor is underwater with the divers. He carefully balanced and placed the lights so they did not dilute the projected images.

The whole production represented an incredible team effort that paid off with an installation that did more than introduce the exhibit—it set the tone. ■

Thomas J. Strodel works as an independent producer and director in traditional, multimedia, and HD productions. His New York-based company is 24fps Productions (www.24fpsproductions.com).



Bob Kertesz and Geryl Abinader monitored the live Ultimatte key to make sure the HD video keys were clean enough to work in post.