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## War Games

Mar 1, 2007 12:00 PM, By Robert Cashill

The most intriguing themed project to open in some time is one you will never have a chance to experience — that is, unless you join the US Navy. In the theme parks world, the hairsbreadth entertainment involves safely fictional, and fanciful, life-and-death situations; at Battle Stations 21, an \$82.5 million installation at the Navy's only boot camp, the Great Lakes Naval Station, the simulated life-and-death situations are grippingly real, as recruits grapple with the kinds of scenarios they are likely to face once their training is complete.



Located 30 miles north of Chicago and housed in a 157,000-sq.-ft. facility, Battle Stations 21 takes the concept of a training simulator to a whole other level. Previously, recruits were put through their paces on low-tech simulations; once they enter “Pier 8” on Battle Stations 21's southern exterior, they begin a 12-hour period of intensive skills testing aboard the *USS Trayer*, a 210' replica of a guided-missile destroyer that floats in a seawater and diesel fuel-scented moat filled with 100,000 gallons of water. The 17 tests the recruits undergo (four divisions, 88 recruits to a division, can use the facility at a time) range from routine matters to full-blown 9/11-era crises, complete with ship-shaking effects, bursts of fire, and screams from ultra-realistic “injured” dummies equipped with triggered MP3 players. The twists and outcomes are cunningly designed to outwit the multimedia-savvy recruits.

Assisting the Navy in its pursuit of absolute realism were the same talents contributing to theme parks and projects worldwide, deployed in a fascinatingly new way that makes a facility that is otherwise off-limits to civilians worth a look. Construction on Battle Stations 21, which started final testing in February, began in October 2005 after a lengthy conceptual gestation. The design team was put in place by Sheila Sheridan, senior project manager of McHugh Construction and Simulation, a division of Chicago's James McHugh Construction Co., and a veteran of three prior Great Lakes installations (and Chicago's Goodman Theatre and Notebaert Nature Museum, among others).

“This project was incredibly hard to coordinate because we had 14 different design companies from nine different states, from California to New Jersey, Oregon to Florida. We used all methods of communication from VTC conferences to teleconferences, ftp sites, and face-to-face meetings in a central location,” Sheridan recalls. “The biggest challenge was that we had to design a building around a story based on specific training objectives. Any time we made changes to that design, we needed to ensure the training objectives were maintained, the timing was consistent, and that we did not change the storyline.”



*Battle Stations 21 takes the concept of a training simulator to a whole other level.*

There was also, she says, a significant language gap at first. “We had the entertainment, construction, training management, Navy Engineering, and Navy Training industries, each of which had a different name for the same thing. NAVAIR, for example, used the acronym CDRLs, the same type of document in the construction world that would be called a ‘specification.’” Once communication was bridged, all went smoothly.

Translating designs into destroyers took its own course. Tim Oien, partner at Morton Grove, IL-based Scenic View Inc., which provided the set fabrication design and services on the project, describes how he was approached:

**Q:** Hey, Tim, umm, I want you to build a ship in a bottle, can you do that?

**A:** Sure we can. How big is the bottle?

**Q:** Uh, well, it's not really in a bottle. It's in a building.

**A:** Well, that is even better! Now when do you want it?

**Q:** And there's just one more thing: Can you put the ship in an ocean setting next to a pier with about 100 themed rooms with fully detailed props, graphics, consoles, buttons that light up, and a couple thousand linear feet of hallways that have to look like you're in a ship?

**A:** Sure, why not!

Los Angeles-based art director Rick Bluhm was among the first to catch the can-do spirit. “The Navy bent over backward to provide the team with information necessary to help us create this environment,” Bluhm says. “It's no easy task to learn the nautical language and the Navy language, with its endless acronyms that rival those found in the entertainment world. And they made it possible for me to be aboard five different destroyers out of three different ports to continue my research, always with red-carpet treatment.”

Bluhm concentrated on designing a convincing ship façade. “The Navy wanted a replica of an Arleigh Burke-Class Guided-Missile Destroyer (DDG). These ships are roughly 500' long and 200' high from the water. Our facility, which had already been mostly locked in, only allowed for 200' in length, and the ceiling trusses were at 50'. My initial research began by ordering and assembling a hobby plastic model of the Arleigh Burke. I also ordered the original Bath Ironworks plans and elevations through the Navy. The Navy then took a key group of us underway on a DDG out of San Diego where we were allowed to photograph and videotape anything we needed for future reference.”

The designer decided to “get the full sense of the ship, rather than trying to do just a portion. So I designed a half-scale ship, leaving off the fantail [rear] since it wouldn't be visible from the revealing POV anyway. The 5“ gun on the forecastle was done at ¾" scale so that it would feel appropriate when standing next to it. Doors, lifelines, and line-handling fittings obviously needed to be full scale for training evaluation. Above eye level, proportions were foreshortened and scaled down so that we could fit in enough of the mast before we hit the ceiling. I selected only the iconic items from the ship's architecture — just enough to give it realism, including the basic weapons systems and rotating antennas.”

The Trayer, Bluhm says, was modeled in Google's 3D SketchUp, “which helped us to massage the facility — which was standard construction — to fit within the radar-deflecting angled ship skin. By turning on and off layers, we could easily spot the conflicts. It also allowed us to easily generate the plans and sections necessary for Scenic View to fabricate the compound curves and angles of the hull and superstructure, and to show the Navy exactly what we were going to provide.”

“The ship façade comprised a couple miles of square tube and angle steel precisely cut, shaped, and formed to create a complete, customized jack system that attached onto the main structure provided by the general contractor,” adds Oien. “Then there were dozens of custom-fabricated, carefully dinged-up-bent-faux painted-decorative Dibond aluminum panels attached onto this framework that would make up the main body of the ship, complete with faux welds and painted water aging applied for realism. There were countless numbers of carefully chosen design elements fabricated that were then attached onto the decorative cladding.”

To provide a lived-in look, the Trayer is dressed with items salvaged from decommissioned destroyers at the Philadelphia Naval Shipyard. Some of these pieces were replicated via molding and casting for placement throughout the passageways. The various rooms aboard, including the command center, the bridge, and the armory, are themed for maximum verisimilitude. Bob Weis, president of Orlando- and Los Angeles-based Bob Weis Design Island Associates, and his team took charge of the art direction, media design and media production, and devised the scenario, in part from gripping interviews conducted with battle-tested Navy veterans. “You cannot hear these stories and feel the dedication of these people who stepped up, without respecting the institution and wanting to do all you can to help,” Weis says.

The 12 hours recruits spend in this fully immersive environment are drama-packed, to say the least. Once the stores are loaded and the lines cast off from the themed pier area, it's all aboard the ship, where, Bluhm says, “the scenery façades, lighting, and soundscape change to become the destination port. Recruits man the watches — bridge, lookout, security, central control, and engineering, among others — each with its own interactivity, soundscape, and projection. They reach the port, trade supplies, and get underway again. While returning, they are hit by terrorist missiles (enhanced by bass shakers in the floor) and ‘man their battle stations’ to fight actual fire, secure flooding compartments, and egress through smoke-filled passageways and find wounded among fatalities.” Draper, UT-based GlobalSim keeps the recruits on the clock via its fully automated Training Management System, which, as a session is in progress, interfaces with wireless PDAs held by training facilitators as the scenario unfolds. “The Navy has been doing all of this manually — with the aid of clipboard, pen, and paper — and it was fun watching them adapt to the high-tech methods,” Bluhm says.

The lighting, provided by Lake Oswego, OR-based Fabian Yeager Design, deliberately returns Battle Stations 21 to a low-tech, institutional feeling. “My direction was that we use only practical lights on pier light poles and façades, and on the ship to enhance the realism instead of making it theatrical,” Bluhm says. Yeager agrees, adding, “Some fixtures ended up as actual Navy-spec fixtures, especially where the recruits were close enough to see or touch them. Others were fairly generic. Associate designer Mark Andrew goosed the façade of the ship with a dozen PAR landscape fixtures to highlight details on the façade and light walkways. He focused several of the pole lights across the pier, from one end to the other, to be “glare” sources, which helped

block out the facility walls at each end. Several lights were used in this way on the ship's façade to help hide where the ship ended and the walls began. "There was always this tough balance of providing enough light for the recruits to do their work, but keeping it dark and controlled enough to maintain the illusion that we were not in a building," Andrew says.

One or two illumination illusions deviated from real life, but purposefully so. "I took liberty with what the actual lighting condition would be onboard a ship under attack," Bluhm says. "In real time, a significant portion of the lights would probably go to battery emergency lighting and ultimately be restored, possibly long after the emergency lights were drained. We have the lights surging (unrealistically) and switching back and forth, with occasional brief blackouts, as if a crew was working to restore power, which continually succumbs to further damage. It provides a sense of duress, as recruits travel between compartments to battle fires and flooding."

Associate designer and programmer Henry Sume worked out the "simple and straightforward, yet vast," system architecture. "Though the training scenario runs on a strict timeline, each individual component needed to be able to start and stop independently," Yeager says. "With over 50 individual rooms and connecting passageways that needed to be independently and asynchronously controlled, we looked to Henry's recommendation of the MA Lighting grandMA Replay Unit. When the facility goes into certain training modes, we are literally running hundreds of cue stacks, performing strobe hits, flickers, and fire and arcing effects. A grandMA Light was provided for the programming period and moved around the facility as required."

The grandMA controls all the show lighting within the facility, Yeager says. "It runs the ETC dimmers, Color Kinetics Color Blast 12s, and Birket Strobe-Briks. The grandMA takes its cues as MIDI show control hits from the AVLS [Audio/Video Lighting System]. In this way, we have programmed what look or effect is happening, but when it happens is up to others. This greatly reduced time in rehearsals, as show control was able to move lighting, sound, and video around on the timeline as needed without having to wait on us to make changes. We had Doug Fleenor Design create some custom hardware for us, principally a DMX-driven solid-state relay that the grandMA turns on and off every second as a 'heartbeat' that is monitored by the OSS [Overall System Supervisor] System. If anything happens to the console, the heartbeat stops, and the OSS system uses a modified remote A/B switch to cut off DMX going out to the dimmers. The dimmer racks, on loss of DMX, play back a preset that provides us with life-safety lighting in the trainer spaces."

The lighting system is monitored by the OSS system, which was installed by Monrovia, CA-based Advanced Entertainment Technology, whose president, project manager David MacMurtry, explains that the system "handles the overall system control as well as the life safety monitoring and all of the atmospheric and mechanical special effects including smoke, scent, and water effects. It interfaces with the Training Management System [TMS] provided by GlobalSim and the AVLS provided by El Segundo, CA-based Edwards Technologies. The TMS, when commanded by the facilitators using the wireless Hand Held Evaluation Tools [HHET], sends cue information to the OSS, and the OSS sends that cue information to start the various scenarios. This is a fairly involved process because there are multiple rooms all operating at the same time but not necessarily all starting or ending at the same moment, as each facilitator handles the stopping and starting of each scenario based on his recruits being in place at the correct time. This was a big change for us coming from the theme park world, where everything is automated and timed to happen at exactly the same time and same way for every single guest."

The audio and video took the company into “uncharted seas — or wavelengths,” says president and CEO Brian Edwards, given the requirement for a live and not an automated scenario. “We were given a set of renderings and a terrific narrative that needed to be translated into audio, video, and interactive experiences that would simulate a real onboard ship environment,” he says. “Additionally, every room and training scenario runs independently of the others, and therefore more multiple combinations of events and timelines can take place. Also, because we are simulating an actual ship, we needed to create an audio environment that ‘sold’ the concept. This included many different point sources and triggered effects. Technically speaking, the challenge was in the integration and commissioning of the various components. We really pushed the limits on most of the source equipment (hard drive-based audio and video players) and ran into the proverbial ‘things you do not know, you do not know.’ The road blocks we encountered were solved one by one; some took days, some took hours, but, in honesty, it was rough seas that took all our years of experience to smooth out the waters.”

The results have been gratifying. “We have all been extremely moved by the reactions from retired Navy personnel who tell us that the level of realism is excellent — so excellent that many of them were a bit shaken up after going through Battle Stations 21,” MacMurtry reports. All this know-how could easily be applied to *24: The Ride*, if the TV show ever comes to a theme park. But there is another crucial difference between a theme park project and Battle Stations 21. A ride deposits you into a gift shop, whereas recruits who pass their tests of fire emerge with something more profound — the title of sailor. Each session ends with a “capping ceremony,” a patriotic, theatrically flavored celebration, where recruits who have succeeded receive their Navy ballcaps. “It is the first time in my career that I have worked on a project whose end result is *not* to generate ticket sales or advertising revenue. It is about saving lives. That is truly rewarding,” says Bluhm, echoing the sentiments of his design shipmates. “Many of today's recruits are leaving boot camp at Recruit Training Command and immediately sent overseas into harm's way without ever having been on an actual ship. If we can make them feel as though they have been on a ship — and performed the tasks they were trained for while under the duress of a mission under attack — then we will have done our job.”

*The writer blogs about entertainment at Between Productions ([www.robertcashill.blogspot.com](http://www.robertcashill.blogspot.com) (<http://www.robertcashill.blogspot.com>)).*

## **BATTLE STATIONS 21**

### **DIMMING AND CONTROL SYSTEM**

- 1 MA Lighting grandMA Replay Unit
- 1 MA Lighting grandMA Console
- 3 Pathway DMX Repeater
- 1 Doug Fleenor Custom Solid State Relay
- 1 Doug Fleenor Remote Input DMX A/B Switch
- 4 ETC Sensor 96-way Dimmer Rack

### **EFFECT FIXTURES**

36 Color Kinetics ColorBlast 12 Fixture  
 64 Birket Engineering Strobe-Brik Strobe  
 140 Diversitronics OD-SS-15 Superstar Strobe

## **THEATRICAL FIXTURES**

36 ETC Source Four Ellipsoidal Reflector Spotlight  
 32 ETC Source Four PAR  
 19 Altman Lighting Outdoor PAR64

## **ARCHITECTURAL FIXTURES**

272 Custom Refurbished US Navy PAR36 Battle Lantern  
 401 LA Lighting Custom T5 Fluorescent Fixture  
 48 Cooper Lighting VT2 Waterproof T8 Fluorescent Fixture  
 54 Kim Lighting Scarab EL720 PAR20  
 52 L.C. Doane Co. US Navy Mil Spec Fluorescent Fixture  
 12 L.C. Doane Co. US Navy Mil Spec PAR38 Fixture  
 21 TMS Lighting High Bay Reflector Fixture  
 122 Luraline Vanguard VS200 Vapor Tight Fixture  
 17 Luraline SecuraLine Wall Flood Fixture  
 26 RAB Lighting VXBR100 Vapor Tight Fixture  
 16 LPDI Lighting Explosion Proof Fixture  
 3 Hubbell Entralux NRG 100 Wall Flood Fixture

## **VIDEO**

3 Panasonic Pt-D7700 Projector, 1,400×1,050 3 DLP  
 4 Panasonic Pt-D5500 Projector, 1,024×768 1 DLP, 5,000 Lumen  
 12 Panasonic Pt-D3500 Projector, 1,024×768 1 DLP, 3,000 Lumen  
 1 Stewart AT-3 Screen, Front Projection  
 2 Stewart Model B Screen, Front Projection, Motorized  
 4 Stewart At-3 Screen, Rear Projection, Fixed  
 12 Draper Cineperm Screen, Rear Projection, Fixed  
 8 Panasonic Th-50PHD8UY 50" Plasma Monitor  
 12 IO Display System  
 1 iGlasses Video Head Mounted Display  
 7 Milestek Cat 5 Patch Panel  
 8 Middle Atlantic MRK-4431 44RU Rack  
 5 Alcorn McBride Binloop AV Server  
 40 ETS PV849 Extended Baseband Video Balun  
 8 ETS PV920 RGB Video Balun  
 8 ETS EB-SDB9-M Serial Data Balun  
 8 ETS PV920 Component Video Balun  
 19 Extron MTP R 15HD RS Twisted Pair Receiver

1 Extron MAV Plus 2412V Matrix Switcher  
 6 Extron MTP DA4 Distribution Amplifier  
 4 Yamaha NHB32C Network Hub and Bridge  
 4 Alcorn McBride Info STN HD WMV-HD Server  
 1 Ethernet Switch  
 1 Network Switch  
 2 Rose Porter RS232 Interface  
 1 Anitech Media Pro 4000 Show Control  
 1 Dell Dimension Diagnostic PC  
 8 Premier PCM-MS2 Plasma Wall Bracket

## VENDOR LIST AND ADDITIONAL PERSONNEL CREDITS

**Design & Construction Lead:** McHugh Training & Simulation, a division of James McHugh Construction Co. | [www.mchughts.com](http://www.mchughts.com) (<http://www.mchughts.com>)

**Architects:** SmithGroup, Los Angeles & Detroit | [www.smithgroup.com](http://www.smithgroup.com) (<http://www.smithgroup.com>) Wight & Company | [www.wightco.com](http://www.wightco.com) (<http://www.wightco.com>)

**Training Management System & Integration:** GlobalSim | [www.globalsim.com](http://www.globalsim.com) (<http://www.globalsim.com>)

**Creative Direction & Media Production:** Bob Weis Design Island Associates Inc. | [www.design-island.com](http://www.design-island.com) (<http://www.design-island.com>) | Melissa Berry, Tim Steinouer

**Audio & Video Hardware:** Edwards Technologies Inc. | [www.edwardstechnologies.com](http://www.edwardstechnologies.com) (<http://www.edwardstechnologies.com>)

**Show Systems & Special Effects:** Advanced Entertainment Technology [www.aetfx.com](http://www.aetfx.com) (<http://www.aetfx.com>) | Jim Bell, **vice president/operations**; John Canton, **control engineer/OSS programmer**; David Libow, **vice president/control system supervisor**; Joe Simmons, **head of design**; Chris Alvarez, **installation supervisor**; Guillermo San Jose, **shop supervisor**; Lionel San Jose, **installation technician**; Eddie Szczesniak, **control installation technician**; Tantris Hernandez, **contract administrator and document control**

**Scenery, Props, & Graphics:** Scenic View, Inc. | [www.scenicview-inc.com](http://www.scenicview-inc.com) (<http://www.scenicview-inc.com>)

**Permanent Color Media Supplier:** Special FX Lighting | [www.fxlight.com](http://www.fxlight.com) (<http://www.fxlight.com>)

**Lighting Design:** Yeager Design, LLC | [www.yeagerdesign.com](http://www.yeagerdesign.com) (<http://www.yeagerdesign.com>)  
 Fabian Yeager, Mark Andrew, Henry Sume

**Lighting Installation:** Meade Electric Company Inc. | [www.meadeelectric.com](http://www.meadeelectric.com) (<http://www.meadeelectric.com>)

**Flame Effects:** Kidde Fire Trainers, Inc. | [www.kiddeft.com](http://www.kiddeft.com) (<http://www.kiddeft.com>)

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