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High-tech Training

Navy's Battle Stations 21 Simulates High-Seas Drama

by Sheila Bacon

Designers and builders are crafting a highly sophisticated battleship at the U.S. Navy's Great Lakes Naval Station 30 mi. north of Chicago, and although the vessel embodies cutting-edge technology and the latest bells and whistles, it will never be on the sea.

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"We call it a ship in a bottle," said Lt. Jeffrey Brancheau, Recruit Training Command facilities engineer with Naval Facilities Engineering Command Midwest.

The training facility for naval recruits is scheduled to welcome its first group next fall. "Docked" inside a new 156,869-sq.-ft. steel framed, multiuse administrative structure in an "ocean" of water, the USS Trayer is designed to look and behave like a real naval vessel. Inside are 16 separate compartments, each offering realistic scenarios through which naval recruits will test their skills on their way to completion of an eight-week boot camp.

Soon-to-be-sailors will spend 12 hours inside the facility in which they will experience a range of simulated experiences, from battling floods and fires to assisting wounded passengers. Once their performance is evaluated and they have passed the exam, the recruits will officially complete their transition from civilian to sailor.

The new \$82.5 million trainer and associated administrative facility is part of the Navy's goal to offer an experience that exceeds the effective but far less flashy training center currently located in a warehouse at the Naval Station. The new center incorporates an array of electronics and special effects to give the recruits an experience as close to a real high-seas experience as possible.

The Great Lakes Naval Station in Great Lakes, Ill., is the only Navy boot camp in the country. Each year, 42,000 Navy recruits are trained there.

"We're training a new generation of sailors," ones that are quickly becoming immune to the high-tech effects delivered by video games and Hollywood movies, Brancheau said.

Based on Real Events

The project, dubbed "Battle Stations 21," was conceived by senior Navy leadership, Brancheau added. Input from these longtime, seasoned sailors resulted in scenarios that mimic real-life events that new recruits will likely encounter at sea. The facility is designed for expansion to accommodate additional future scenarios.

The Battle Stations building, a reinforced concrete structure, will show two faces. Its north elevation will provide a traditional red brick exterior, reflecting the style of the base's historic Georgian structures. Its southern exterior, where recruits will enter "Pier 8" to begin their Battle Stations experience, will feature a descent along a walkway to a below-grade entrance, providing the feeling of being away from the base.

The design-build team includes James McHugh Construction of Chicago; lead architect/structural engineer/MEP engineer SmithGroup Inc. of Los Angeles; design architect Wight and Co. of Darien, Ill.; and lead integrator GlobalSim of Salt Lake City.

Half a dozen simulation consultants are on hand to design the rooms, systems and theatrics for a project that includes more special effects - including shaking floors, piped-in smells, smoke, screams and extreme temperatures - than a theme park ride.

The owner is the Navy's Recruit Training Command of Great Lakes. NAVFAC and the Naval Air Systems Command are jointly overseeing design and construction. The partnership was formed to take advantage of NAVAIR's simulation experience and NAVFAC's facilities management and construction expertise.

"We've got a lot of consultation going on here to make sure we end up with just the right project," Brancheau said. "It's quite an undertaking. Every Naval sailor for the next 40 or 50 years will come through this facility."

Complex Construction

Construction of the trainer and the surrounding administration building is occurring simultaneously, said Brian Anson, project manager with James McHugh Construction.

"We have two different mindsets here," he added. "One is a typical building; the other is anything but."

Scheduling and sequencing is key, Anson said. Crews shift focus between the administration center and the trainer as milestones are met. Once the administration center was enclosed, work started in earnest on the trainer. Once that is substantially complete, crews will focus on the administration center's finishes.

The project - especially construction of the trainer - differs greatly from a typical office building or school, Anson said. Most jobs involve installing mechanical, electrical and piping systems first, then enclosing the walls. Here, since the exposed ductwork must mimic that of a real ship, builders are finishing the walls, then concentrating on the MEP work.

Meshing the work ethic of builders with the creative-driven scenario consultants has been challenging as well.

"The art side is pushing for fidelity, while we are pushing to meet a schedule and budget," Anson said. "They are coming from an amusement park-type background and want to do whatever it takes. Our focus is on saving time and money."

Numerous meetings and constant discussion between the design team, contractor and owner help bridge the gap and come up with a happy medium.

Supporting Scenarios

Ensuring that the correct infrastructure is in place to execute the bomb blasts, floods and mass casualties presented inside the USS Trayer was the responsibility of SmithGroup designers, and that was not easy, said Arun Bhavsar, principal and project manager in the firm's Detroit office.

Designers frequently came up with unique ways to ensure the scenarios would be as realistic as possible. For instance, the "ocean" in which the USS Trayer sits is stagnant and needs to be continually disinfected. Using chlorine, however, wasn't an option.

"You can't call it an ocean if it smells like a swimming pool," Bhavsar said. Instead, a complex ozone and ionization system was created that eliminates the need for odorous chemicals.

Designers also found subtle ways to draw water from the "ocean" for use in the flood scenarios inside the ship. Gravity, combined with sloping floors and a hidden pipe, help one of the rooms fill with water. Once the scene is complete, the water drains to a trench and a series of filters strains the water for any debris.

The ionization system cleanses the water of bacteria and it is then pumped back into

the ocean.

Another scene uses large amounts of glycol to create steam. Because the USS Trayer is located within an enclosed building, the glycol needs to be quickly removed from the space to prepare for the next scene.

SmithGroup engineers designed a rapid exhaust system with extensive ductwork and exhaust fans in the roof to quickly ventilate the area. Such systems are automated and integrated into a standard building management system.

In a scenario that involves the aftermath of a bomb blast in a mess hall - reminiscent of the USS Cole's bombing in Yemen on Oct. 12, 2000, that killed 17 U.S. sailors - designers incorporated oversized coils into the heating system to quickly bump the room's temperature. An efficient ventilation system is then used to exhaust the heat and just as quickly bring the temperature back down.

Keeping it Real

Creating an aesthetic that resembled a real naval destroyer was at the forefront of the architects' minds. Designers and key project team members spent two days during the design phase as guests on a guided-missile destroyer - the USS Stethem based in San Diego - to document materials, lighting, finishes and equipment. Designers have mimicked minute details of a naval vessel's infrastructure to bring as much realism to the trainer as possible, said MarkMcVay, SmithGroup principal in the firm's Los Angeles office. In places, running a cable tray or mechanical ductwork diagonally across a compartment would be most efficient. To replicate the tight quarters of a real ship, however, designers created mock, 90-degree joints and associated exposed ductwork.

Because the project was designed to be used by only able-bodied recruits, the designers could ignore Americans with Disabilities Act requirements.

"Designing for ADA is sort of second nature at this point, so this was very different from anything we design today," McVay said. Completion of Battle Stations 21's construction is expected in February. After a few months of commissioning and training, the first round of recruits will pass through the facility in early fall.

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