



Delivering the Goods

News from the U.S. Coast Guard Acquisition Directorate

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U.S. Coast Guard Embraces Human Factors Engineering

By Linda M. Johnson

WASHINGTON – The U.S. Coast Guard recognizes the importance of human factors engineering when it comes to designing, building and acquiring new assets and systems.

“The Coast Guard is a very technologically focused organization for an obvious reason—we rely on things that float and go to sea,” said Christian Kijora, human factors engineering team lead in the Coast Guard’s Human Systems Integration for Acquisitions Division. “But it’s the people who get the job done. We ensure that the technology we provide to our people does the best job for them so they can do the best overall job for the citizens of the United States.”

Human factors engineering is the discipline of applying what is known about human capabilities and limitations to the design of products, systems and work environments. Its goal is to improve system performance, reliability and ease of use while reducing ownership costs, training requirements, operational errors and user fatigue.

“Human factors is a branch of engineering psychology that deals with human performance and systems,” Kijora explained. “It’s about making use of the technical elements of human performance when you design, build or acquire a system. The reason why we do that is because human performance is the most limiting factor in systems integration today.”

The process involves creating a design based on people’s capabilities. “Our mantra is to design the system for the user, not try to design the user for the system.” he said. “It’s a lot easier and cheaper, and it helps keep the program on track as far as cost, schedule and performance. On the other side of it, the users get a system that is designed for them so they get greater user satisfaction. It also improves retention and overall performance of the unit.”

“What we do has a significant impact on the total ownership cost to the organization and operational capabilities,” Kijora said. “We help balance and make those trade-off decisions with the program manager to make sure that person is buying the right thing to support program goals.”

Human factors engineering is part of a larger effort known as human systems integration, which is a management and technical approach applied to seven distinct disciplines: manpower, personnel, training, human factors engineering, system safety, personnel survivability and habitability. Human factors engineering is



Dawn Gray with the Coast Guard’s human factors engineering team reviews the bridge mock-up for the first Sentinel-class Fast Response Cutter. The mock-up review identified some necessary changes that were incorporated into the bridge design. *U.S. Coast Guard photo by Chris Kijora*

particularly concerned with the last four disciplines.

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Usability Testing of Assets

The primary areas of an asset, such as a ship, that human factors engineering focuses on are the bridge, combat information/operations center, engineering control, topside work, and the launch and recovery of small boats and helicopters.

Another area of focus is the ease of maintenance as the Coast Guard is forced to use its assets more and more. "For instance, with the National Security Cutter, the Coast Guard is testing a crew rotation process, which means more days at sea and fewer days at homeport to do maintenance, so ease of maintenance becomes critical," Kijora explained.

Human factors engineering uses task analysis to break down work into jobs, tasks and subtasks. "Task analysis is part of what's called user-centered design, which puts the user at center of the design focus instead of the technology," he said.

Along with task analysis, human factors engineering uses mock-ups, which are working replicas built to scale for design testing purposes. A mock-up is "a wonderful, low-cost tool we use. I call it discount human factors. We introduce a controlled environment rather than the random things a user might come up with," Kijora said.

"One of the other benefits with mock-ups is that the users can actually see the outcome of their work in terms of the product that gets designed," he explained. "That develops a lot of customer confidence in what Acquisition Directorate is buying. And we like to do it because we want the users to know that we're developing systems for them."

Kijora's team recently finished some mock-up reviews for the Sentinel-



Human factors engineering applied non-skid decals and added grab rails to the cabin roof of the Response Boat-Medium to enhance operator safety when performing routine maintenance. *U.S. Coast Guard photo*

class Fast Response Cutter (FRC), the first of which is expected to be delivered in spring 2011.

"The contractor had offered up the design of a bridge and built a mock-up," Kijora noted. "We wanted to validate whether that was a good design for the Coast Guard or not. We came in with bridge crews from a PC-179 coastal patrol ship and had them run through scenarios. Through that, we identified a number of issues that we thought were important enough to cause the contractor to change the bridge design. Overall, it was a really good bridge but there were some areas that needed improvement."

Kijora's team also performs system safety analysis on new assets. For example, a systems safety engineer has been working on the WSESRB (Weapon System Explosives Safety Review Board) certification process

for the FRC in hopes that getting certified will be "a walk in the park instead of a struggle. WSESRB tells you whether or not you can use your guns, so it's a really important certification to have," he explained.

Human factors engineering acts as one of the service's technical authorities but also works closely with the project's sponsor. "As the Coast Guard is maturing in its own acquisition capabilities, we're trying to work more with the sponsors for setting requirements early," Kijora said. "We can't get started early enough. You can pay me now or you can pay me later but if you have to pay me later, you probably can't afford it. It's far cheaper to have us come in and give our requirements to start with." ■

Rescue 21 Is Standing Watch Over Most of Continental U.S. Coastline

Rescue 21, the U.S. Coast Guard's advanced search-and-rescue communications system, is now standing watch over the Eastern Seaboard, Gulf Coast and much of the West Coast. The system is operational along more than 35,000 miles of U.S. coastline from Boston to Houston and from Seattle to San Francisco.

Rescue 21 is an advanced command, control and communications system created to better locate mariners in distress and save lives and property at sea and on navigable rivers. As the maritime version of 9-1-1, it facilitates better communication and interoperability in emergency situations, and provides communications coverage out to a minimum of 20 nautical miles off the coastal zone.

"Rescue 21's direction-finding capabilities provide lines of bearing to the source of the transmission and enable watchstanders to more accurately direct response assets to the distressed mariner," said the Coast Guard's Deputy Assistant Commandant for Acquisition Michael Tangora.

This new capability increases the Coast Guard's ability to execute all its missions, especially its search and rescue mission, with greater agility and efficiency. At the June 14 formal acceptance ceremony for Rescue 21 at Coast Guard Sector Charleston, S.C., Tangora cited two recent search-and-rescue cases that were successful because of Rescue 21's advanced capabilities.

Dozens of watchstanders and local officials attended the formal acceptance and demonstration ceremony and then toured the sector's new command center and interagency operations center.

With its advanced direction-finding capabilities and increased range,



Coast Guard Sector Charleston held a formal acceptance ceremony for the newly installed Rescue 21 system June 14. Capt. Michael McAllister, Commanding Officer of Sector Charleston, talks about the important new search and rescue capabilities provided by Rescue 21 along the South Carolina and Georgia coastline while Michael Tangora, Deputy Assistant Commandant for Acquisition, looks on. *U.S. Coast Guard photo by Richard V. Kanehl*

Rescue 21 helps the Coast Guard better "hear the call" and quickly respond to boaters in distress. The systems also helps identify hoax distress calls that can unnecessarily divert Coast Guard assets and manpower.

"Rescue 21's acceptance in Sector Charleston marks a tremendous leap forward in our ability to save lives at sea and increase the safety of mariners along the busy South Carolina coast," explained Rescue 21 Project Manager Gene Lockhart.

Rescue 21 is expected to be deployed in Coast Sector San Diego and Sector Los Angeles — Long Beach by the end of this year. The system is expected to be installed in Hawaii by January 2011, and in the Great Lakes region by the end of 2012.

For more information about Rescue 21, please visit www.uscg.mil/acquisition/rescue21 ■

MASTER CHIEF AYER,

Q. I see the National Security Cutter (NSC) is outfitted with the ASIST system on its flight deck. Our helicopters are not outfitted to use it, so why do we have it?

A. Let me give you a little background first. The ASIST system is an acronym for Aircraft Ship Integrated Secure and Traverse. It is a computer-controlled system used to capture and move helicopters once they land on a cutter's flight deck.

ASIST makes the landing process much safer for both air crews and cutter crews by automating the tie-down and traverse process. Not being an aviator myself and not being completely sure that helicopters were ever intended to land on moving objects, I know the laws of physics do allow it, and we take full advantage of that fact by doing it every day. In my mind, anything we can do to increase the safety of the operation is something I support.

As you know, the MH-65C is the aircraft typically deployed aboard flight deck-equipped Coast Guard cutters. On legacy cutters, the Talon system installed on the H-65 aircraft is used to secure the aircraft to the deck upon landing, and the aircraft is traversed into the hangar manually with the aircrew and ship's crew pushing the aircraft. The ASIST system is designed to both secure and traverse the aircraft into and out of the hangar. However, it was originally designed for larger and heavier helicopters, such as the AS332 Super Puma and H-60 Seahawk. The ASIST system has been tested successfully with such larger aircraft and is being used by several navies around the world, but not yet in the United States.

So where are we on this? Once funding was provided in late 2007, we began efforts—in partnership with the CG Aviation Logistics Center, the Office of Aeronautical Engineering (CG-41) and the Office of Aviation Forces (CG-711)—to design, develop, integrate and build a prototype of an MH-65C with the complex ASIST system installed. Modifying an aircraft is not something you want to rush into. That prototype aircraft is now complete and is undergoing extensive testing aboard our newest NSC, USCGC Waesche, this month. If everything goes well, future NSC-based MH-65s will be modified to use the ASIST system that is already installed on our NSCs.

— MCPO Brett F. Ayer, Command Master Chief, Coast Guard Acquisition Directorate

[To submit a question for an upcoming Acquisition Directorate newsletter, please e-mail Master Chief Brett F. Ayer directly at: Brett.F.Ayer@uscg.mil or acquisitionwebsite@uscg.mil.]



A Republic of Singapore Air Force Super Puma takes off from the flight deck of the Republic of Singapore Ship Resolution, an Endurance-class tank landing ship. The ASIST system is visible in the foreground. *U.S. Navy photo*



Shown here is the ASIST system track aboard the newest NSC, USCGC Waesche. *U.S. Coast Guard photo by Linda M. Johnson*