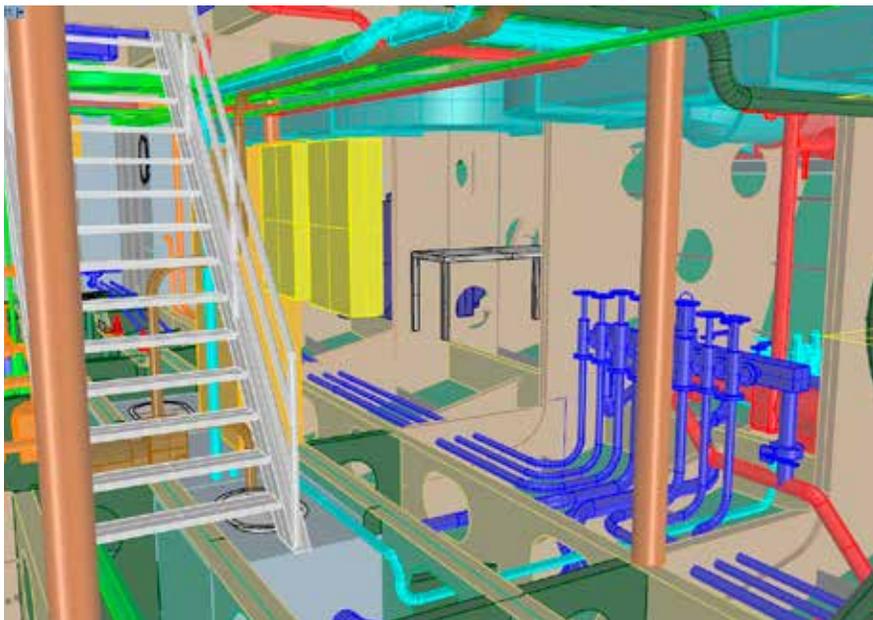


Scanning the Horizon for New Technologies? 3D is Already Aboard

By Karen Rainbolt, FOGHORN Managing Editor



ENGINE ROOM 3D VESSEL SCANS

EBDG has utilized 3D scanning services for many clients, in this example engineers scanned the engine room of a passenger vessel. (ABOVE) EBDG produced a highly detailed drawing package for the client to be used during construction. The drawing was used to identify where systems would interface and recognize any potential problems before construction. (RIGHT) Actual photo of the engine room.

Perhaps you've taken a virtual tour of a house for sale simply by clicking a few buttons on your computer, tablet or Smartphone and were able to navigate through a home to see all its nooks and crannies. Or, if you've ever used the Google Maps Street View feature to virtually "drive" or "walk" on streets anywhere in the world with the ability to turn at will to see everything around you, then you've experienced the technological wizardry made possible through the use of 3D scanning.

Now, that technology is being applied to the passenger vessel industry in a number of creative ways.

"This is a great tool," said Jeffrey Robert, Port Engineer at PVA Vessel member Cape May-Lewes Ferry in N. Cape May, NJ. The ferry system is doing a "complex, but straightforward" engine repower and 3D scanning is being utilized to make the planning and installation easier.

"Due mostly to the difficulty in obtaining parts and environmental concerns, we're repowering two of our vessels with PVA Associate member Caterpillar's Tier 3 EMD 12 cylinder 710 engines," Robert explained.

What Is 3D Scanning?

According to the website of PVA Associate member Elliott Bay Design Group (EBDG) in Seattle, WA, 3D scanning "is a valuable tool used to gather a wealth of data with ultimate accuracy. Its result is an effective visual communication aid that vessel owners, operators and shipyards can use to make better, more informed

decisions." 3D scanning provides marine engineers with the ability to evaluate data and solve problems more precisely.

3D scanning can support a variety of marine applications, including:

- Exterior hull scanning
- Interior layout
- Piping systems modifications
- Structural modifications
- As-Built drawing development
- Hull model development
- Vessel stability documentation
- Major vessel modifications
- Ballast water treatment installations
- Equipment removal and replacement interferences
- Lines Plan
- Walk-through capability



How Does it Work?

3D scanning uses two technologies: Point Clouds and Photospheres. The first uses a laser or infrared camera to capture reflected light off objects relative to the camera's position. These points are given an X, Y, and Z value for location (3D = three dimensions) and also are assigned a Red/Green/Blue (RGB) value to color those points. Computer software registers all of the points to each other to provide a highly accurate "point cloud" of the scanned space.

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(LEFT) After construction, our engineers conducted a full vessel 3D scan using Matterport. This image of a point cloud shows the same engine room view as our model. (RIGHT) When we overlay the two images, scanned and model, we see the accurate details of construction to our design.

The second uses a series of photos that are later “stitched” together to create a seamless, fully interactive image that allows users to move at will to view 360 degrees of the scanned area. EBDG engineers then take the scans from both technologies to develop highly detailed models, as-built drawings or system sketches.

Robert Ekse, who works for EBDG on the Cape May-Lewes Ferry project, explained that the set up for a 3D scan is simple. The tools required are an iPad, a 3D scanner, and a tripod. A software or service license to process and host data is also required.

EBDG uses a variety of different scanners and software tools to provide unique outcomes and deliverables for its clients. For the Cape May-Lewes Ferry project, EBDG utilized Matterport, a software firm that combines spherical imagery with the point cloud to create an interactive, web-based tour of a space. Matterport has perfected immersive 3D technology to capture, edit and share virtual spaces accessible on any screen.

“This project lent itself well to 3D scanning,” Ekse said. “In this case, our focus is on the engine room and other areas of operation so that we can all clearly see the spaces impacted as the refit moves forward.”

Scanning goes quickly, according to Jeffrey Robert. “It takes just a day to scan a vessel.”

Once the scans are uploaded, stakeholders such as the vessel operator,

engineering firm, shipyard and vendors can virtually tour the ferry. For Cape May-Lewes Ferry, this means Caterpillar, the engine manufacturer involved in the repower, can virtually step inside the engine room to see firsthand where the equipment will be installed.

For Robert, the 3D scanning offers a myriad of benefits. “The ferry was built in the ‘70s, so we only have blueprints of it,” he said. “We don’t even have any CAD drawings, so the 3D scans are leap-years ahead of what we had going into this project.”

Benefits of 3D Technology

Both Ekse and Robert are excited by the advantages that 3D scans offer. Both believe that communication is greatly enhanced. Instead of trying to verbally describe something on a vessel, with a few clicks on their computer screens, stakeholders can quickly navigate to exactly what they need to see.

“Even if a vessel is underway, someone onshore can pull up the scan and virtually ‘walk’ through the ferry as needed,” said Ekse.

Both agree that this technology significantly minimizes downtime and can reduce travel costs for site visits.

EBDG’s clients have also realized 3D technology is an excellent resource for training new crewmembers on a vessel, even before they first step foot onto it.

And, Robert said, their ferry system is using 3D scans in the hiring process

to identify highly qualified job applicants. “The Port Captain is using our ferry scans in the interview process to gauge the skill and reaction of candidates during a ‘virtual fire drill’ to test on-scene commands,” he said.

Ekse and Robert concur that the technology can also be an innovative and strong marketing hook especially in the passenger vessel industry. Utilizing 3D scans, passengers can view vessel interiors, cabin space, lounges and venue rentals before booking. If, for example, a vessel operation offers private charters for weddings, planners can use the technology to see how the vessel could fit their event.

For the Cape May-Lewes Ferry repower, the cost of the 3D scanning was rolled into the overall project proposal, which will take up to five months for the shipyard phase to complete.

EBDG stated on their website, ebdg.com, that 3D scanning “gives our engineers the ability to evaluate data and solve problems more precisely. EBDG is committed to incorporating advanced technology and design approaches to increase our efficiencies and engineering solutions for our clients.”

“This is an evolution of knowledge,” Ekse declared. He and his team are eager to see where 3D technologies will take the maritime industry next. ■

Stephanie Gullickson, EBDG Marketing Manager, contributed to this article.