

NAVY SBIR TRANSITION PROGRAM

SPOTLIGHT

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Design Mill's SBIR innovation finds new energy in the commercial sector

The tech industry's rapid adoption of artificial intelligence (AI) in recent years has sparked intense demand for the electricity these energy-intensive tools rely on. Utility companies are scrambling to stay ahead of demand by acquiring and building new electricity substations to meet the growing need. To help manage its expanding portfolio of substations, Dominion Energy, which supplies electricity to 3.6 million homes and businesses in Virginia, North Carolina, and South Carolina, is relying on an innovative Navy SBIR-funded technology from Design Mill.

"It's a big win for us in the commercialization of this technology," said Nathan Greiner, CEO of Design Mill.

Originally developed for the U.S. Marine Corps, Design Mill's Shipboard Dimensional Analysis Tool (SDAT) helps assess whether new vehicle designs will fit aboard Navy ships before a prototype is built. Starting from a high-fidelity 3D scan of the ship's interior, SDAT integrates ship and vehicle data to create a 3D virtual environment, allowing users to place and visualize vehicles along their intended paths within ship stowage spaces and on ramps.

The Marine Corps' fleets of ground vehicles are transported around the world aboard the Navy's amphibious ships and prepositioning ships. Tyson Kackley, the modeling & simulation lead/prototype technical lead at the Marine Corps Wargaming Capability program management office, said SDAT addresses a longstanding need at the Marine Corps-Navy interface. Kackley authored the 2017 SBIR solicitation and served as technical point of contact for Design Mill's Phase I

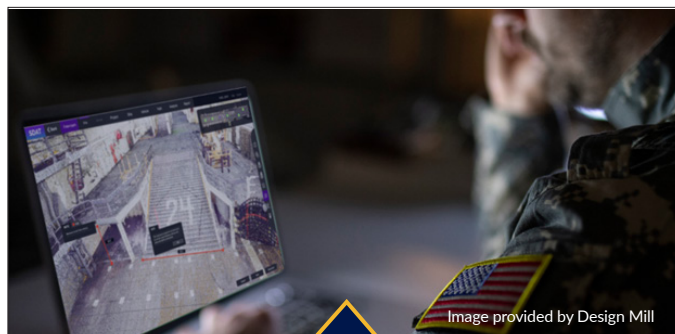


Image provided by Design Mill

SDAT was designed to enable transportability assessments of vehicle designs aboard Naval ships prior to prototyping.

and first Phase II contracts.

"It's a very long list of equipment—vehicles of all different sizes, all different weights, some of them tracked, some wheeled, some with trailers—and you've got to get them on all these different Navy ships," he explained. "It's a very tight space and there are many factors—not just the physical dimensions of where it has to fit but the turning radius, weight, and what happens when you start tipping the vehicle."

For anyone who's tried to maneuver a large SUV inside a parking garage or move a couch up a flight of stairs, the problem is readily understandable. Further complications arise when modifications take place, as any change to either the vehicle or the ship's interior space, even something as minor as adding a rigid antenna, can affect whether a vehicle will fit. Without a tool like SDAT to evaluate these issues during the vehicle design process, Kackley said, the Marine Corps must wait until a prototype vehicle is available, transport the vehicle to the ship and conduct a test drive. At that late stage,

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if a problem is discovered, it may be too costly to go back and change the design. In many cases, the Marine Corps must simply accept that it won't be able to fit that vehicle (or as many of them) into the space allotted for Marine Corps equipment on the transport ship.

With advances in LIDAR scanning technology in the early 2010s, Kackley envisioned a tool that would help both Marine Corps vehicle program officers and Navy ship program officers evaluate the spatial consequences of planned designs and changes before implementing them, saving both organizations time, money, and headaches. This foresight led to the 2017 SBIR topic that Design Mill successfully pursued. SDAT is a cloud-based system that allows users to take a virtual test drive through a ship, conducting a physical interference analysis along the selected path. SDAT integrates vehicle design data (typically a CAD model) with LIDAR scanned ship data, using novel surface rendering and computer processing methods to enable path selection, collision computation and analysis at increments as small as one inch. Users can specify the desired vehicle-to-ship clearance distance and can generate reports and products to support vehicle design decisions. The ability to perform this analysis virtually would allow the Marine Corps to make necessary changes in advance of milestone decisions, avoiding costly surprises after the physical prototype has been built.

Through a second Phase II contract concluding in 2025, Design Mill expanded SDAT to include an instructional module for classroom use. This allows instructors to insert themselves into a

3D digital twin of a ship's interior during military schoolhouse training. Sailors can familiarize themselves with their ship before deployment. Beyond design and training applications, the tool also can improve daily operations.

"If we're all having a meeting or getting a brief, we'll pull up this scan and can talk about that part of the ship without going down seven flights of stairs to talk about it in person. It's a major time saver," Greiner explained.

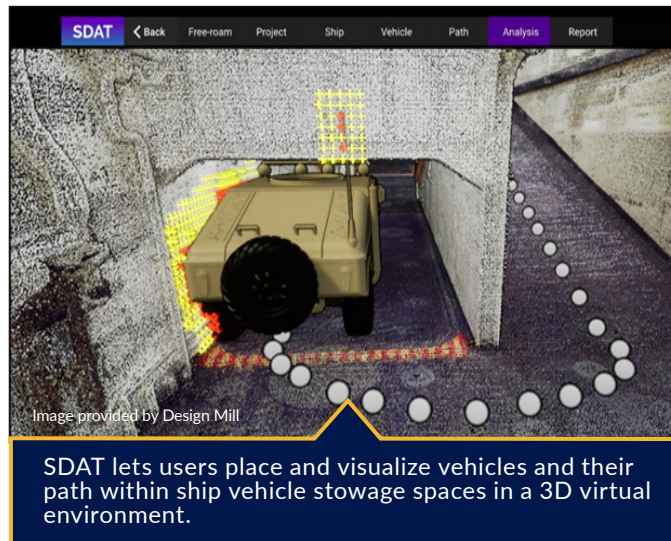
SDAT can also be used on a mobile device, such as an iPad, to determine on the spot how to fit and load equipment efficiently.

Although Design Mill was new to the SBIR program when awarded the Phase I contract for SDAT, the company had previously subcontracted with larger defense firms. The SBIR experience was positive, as the company built a strong relationship with

their technical points of contact and worked with the Marine Corps to incorporate feedback and build a product that met the customer's needs. Like many small businesses, Design Mill struggled to navigate the gaps in funding between SBIR awards. Fortunately, while SDAT is not yet deployed by the Marine Corps and Navy, its capabilities have broad commercial potential, such as warehousing and factory design, port and railroad operations, and commercial aviation logistics.

That commercial potential is now being realized through the Dominion Energy project, which began in the spring of 2025 and could last up to five years, allowing Design Mill to continue evolving the technology.

"We're taking the kernel of what we developed under the SBIR contract and using it to capture all



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their substations,” said Greiner. “They need this platform to make their jobs easier so they can keep pace with the AI boom. The thirst for power in the AI age is trickling down to us.”

For Dominion Energy, as for the Marine Corps, detailed LIDAR scans of their assets housed in a cloud-based database is a key feature that makes Design Mill’s platform such a valuable innovation. “That was not available when this started, so we had to develop it,” Greiner noted. “We built an entirely cloud-based solution that allows users to have huge datasets available from any computer or cell phone, without using any of the power of your device. It’s all in the cloud, versus other technologies that would download from the cloud.”

Currently, Design Mill has a 20-person team scanning Dominion Energy’s substations along the East Coast. Each LIDAR scan takes only a few hours, after which the data is processed and added to Dominion Energy’s cloud database.

As Dominion Energy expands, the company will be using its library of scanned substations to carry out analysis similar to the Marine Corps to determine whether new equipment can fit in the required space. The power company has other applications in mind that Greiner is excited to develop as well, such as overlaying geolocation and real-time sensor readings, and running security simulations to defend against potential physical sabotage. In the future, pending approval from the Federal Aviation Administration, the technology could be used to visualize the location of monitoring drones that will travel from one substation to another.

“There are a million concepts on the way but the core is that this authoritative data source needs to be in the cloud. We’re talking about petabytes of data,” Greiner said. “We don’t see other software out there at this level of size or complexity.”

As a small business that’s relatively new to

defense contracting, Design Mill took advantage of the commercialization assistance opportunities the Navy SBIR program offers. The company participated in the Navy SBIR Transition Program (Navy STP) during both of its Phase II contracts. “The Navy STP gives you access to other parts of the Navy. They’re connectors to the right people and that’s been very helpful,” Greiner said. Navy STP Connect, a virtual event for small businesses to schedule one-on-one meetings with government and prime contractors to explore potential transition opportunities, helped introduce SDAT to multiple program offices. “They get it. We don’t have to painstakingly dig up the program office and find the right person and try to get them excited about this technology that we know can help them while they are still wondering who we are. That was great. It got us exposure to NAVAIR and other areas of interest.”

Additionally, DoN SBIR/STTR Programs director Brian Shipley steered Design Mill to Navy Launch, which helps Navy SBIR Phase II awardees develop and implement a commercialization strategy. “We’re technology people,” Greiner said. “They’ve really helped us figure out how to talk to customers, adjust our message, and bridge the gap to the commercial side.”

Design Mill is a strategic systems integrator delivering pioneering solutions for the military and industry leaders, focusing on the internet of things, laser scanning, virtual reality and augmented reality. A three-time recipient of the Intel Software Innovator of the Year award, the company continually works to transform the integration of cutting-edge interactive hardware and software through innovative design, development, and processes.

For more information, visit www.designmillinc.com.

