

NAVY SBIR TRANSITION PROGRAM

SPOTLIGHT

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Hot Technologies; Cool Results: How TDA Research Leverages SBIR to Create a Safer Work Environment for the Fleet

By Julie Scuderi

Heat exhaustion is a very real concern for Navy workers at shipyards; while wearing heavy personal protective gear, these workers weld and perform other maintenance operations at extreme temperatures. Because of this risk, the Navy has continually sought novel technologies designed for workers that reduce the risk of heat exhaustion.

One of these technologies comes from longtime Department of Defense (DoD) collaborator and small business TDA Research, Inc. TDA often leverages Small Business Innovation Research (SBIR) awards to help fund these critical developments, and one of its newest game-changers is its cooling shirts designed to keep the core body temperature where it should be.

TDA was able to draw from 35 years in the business and its product suite devoted to thermal management. Though the company had a patent at the time on its cooling technology, it was nothing more than conceptual. Through a series of SBIR awards with the Office of Naval Research, TDA and its industrial clothing manufacturing collaborator embarked on a journey to turn this concept into a reality; one that would eventually save lives. They developed a simple, comfortable, lightweight, durable cooling shirt that would keep welders in Navy shipyards cool and comfortable, while protecting them against heat related illness and using a minimum of consumables.

“One of the most effective ways to cool your body down is to sweat, but these heavy clothes you have to wear while welding prevent that from happening,” explains Dr. David Eisenberg,



U.S. Navy Photo

TDA Research leveraged several SBIR awards to solve a pressing issue: welders in Navy shipyards who were overheating. The company developed a lightweight and durable cooling shirt that keeps workers cool and comfortable while protecting them against heat related illness.

senior engineer at TDA. “Our shirts contain small channels that allow for five to 10 times higher sweat evaporation, allowing the body to cool itself.”

Testing of the garment followed soon thereafter. TDA worked with the National Personal Protection Technology laboratory (NPPTL) and used their sweating thermal manikin (an advanced manikin that simulates metabolic heat generation, sweats, and is outfitted with thermal sensors) dressed in heavy welding gear in an environmental chamber set at 90-100 degrees Fahrenheit with 30 to 40 percent relative humidity to test the cooling shirts. TDA’s cooling shirts reduced the skin temperatures by five to six degrees Fahrenheit and reduced core body temperature up to two degrees Fahrenheit,

which can be the deciding factor between requiring hospitalization or not.

After the successful testing at NPPTL, the Navy awarded TDA a cooperative research and development agreement (CRADA) to further evolve the technology. There is interest in several sectors within the Navy, including for service members who wear explosive ordinance disposal (EOD) suits to protect them from explosions. Because of this, TDA is currently developing another version for this application.

Another area of interest is the commercial sector. TDA is thankful that its longtime participation in the Navy SBIR Transition Program (Navy STP) positioned them to approach other end users and kick off key conversations.

“SBIR and the Navy STP program helped to put us in contact with a lot of our potential customers,” says Eisenberg. “It is extremely important to take this to the commercial sector. There is so much applicability in outdoor recreational activities and sports where you’re wearing heavy gear, and also in the civilian market whether it’s welders or construction workers. And by working with the people at NAVSEA and ONR, it gave our potential commercial customers confidence in our technology.”

TDA is a prime example of transition success resulting from the SBIR program. Over the last three decades, they have developed innovative research and development solutions to meet

the needs of the warfighter. TDA develops and manufactures advanced materials, chemical processes and aerospace and military hardware. Sales of products developed on SBIR contracts total \$101 million and Phase III revenue and investments that have stemmed from its SBIR-funded innovations are about \$261 million.

When asked for any words of wisdom for the SBIR newcomers, Eisenberg explains, “For a company just starting out, the idea is to focus on one main technology in which you’re an expert, but when you win an award, it allows you to branch out. Take for instance our cooling garment: It was developed with the

help of a chemical engineer at our company who does sewing as a hobby. With the SBIR funds, we were able to find an expert in the garment industry who helped us to make these by hand, and she brought a wealth of garment manufacturing design and development skills to our team. Start with one skillset but bring in others.”



Image courtesy Yura Forrat, Pexels.com

TDA Research credits the Navy STP program with putting them in contact with potential customers in the commercial sector. The construction industry is just one sector with a wealth of potential due to the safety and well-being of workers wearing heavy gear at high temperatures

Looking to the future, TDA is working on making the shirts more accessible through a lower price tag. “Right now, we are making them all by hand right here in the U.S. using specialized labor, which is very expensive,” says Eisenberg. “Each shirt is currently very expensive, so as we look to automate manufacturing, we’re hoping to bring down costs.”