

NAVY SBIR TRANSITION PROGRAM SPOTLIGHT

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Physical Sciences, Inc. plans \$9.6 million facilities expansion to boost advanced weapons systems development

PSI plans to invest \$3 million in site improvements and over \$1 million in capital equipment over the next two years at its New Hampshire site where it develops and tests new rocket motor and engine technology as well as new propellants. At the same time, the company will invest another \$5.6 million expanding its Massachusetts chemistry facilities to scale up production of key non-energetic ingredients used in propellant and energetics production. PSI plans to break ground this year and expects the expansion project to be complete by the end of 2026, according to vice president of propulsion and energetics Jeff Wegener.

PSI began to focus on energetics R&D work for the DoD in the mid-2000s, says Wegener, and the range of technologies the company works on has grown to include just about everything related to propulsion and energetics: propellants, fuels, solid rocket motors, liquid rocket engines for space and launch applications, air breathing engines for cruise missiles, and jet engines.

"The combination of being a nimble small business and having experience in that area has allowed the energetics business to grow for us," says Wegener. "That's what motivated our facility expansion. We've been operating in New Hampshire for eight years now, and we've outgrown our current facility."

The facilities expansion will benefit PSI's work in several ways. "You need a lot of acreage for energetics work," Wegener explains.



Image provided by PSI

PSI's facility expansion will centralize operations related to motor manufacturing, leading to faster and more consistent production. PSI has developed and demonstrated "Motor in a Day" capabilities by mixing, casting, curing, and firing a solid rocket motor within a single business day.

"Specifically, in the world of propulsion and energetic materials you're doing hazardous experiments. Safety is a core part of the program, and the DoD often looks to us to do those projects quickly because we need to catch up to our adversaries."

PSI's facilities at the New Hampshire site will grow to three times their current area. In addition, the company will control a larger, wooded area surrounding the facility, which provides a safety buffer and enhances security. According to Wegener, this safety buffer will make PSI compliant with DoD requirements for storing explosives. Located in southern NH, the facility is approximately one hour from Boston, giving PSI access to world-class R&D talent while still providing "a remote location where you can make a lot of noise," says Wegener.

PSI describes its energetics business as a

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“molecules to motors” approach. The company carries out R&D at every level of the supply chain, from synthesizing novel molecules to creating new energetic ingredients, and then scaling those processes up to produce and test new weapons technologies that can be used by the DoD.

“That kind of vertical integration in the development world is uncommon with energetic materials,” says Wegener. “There’s a lot of risk in using new energetic materials. Most of the explosives that we use in the United States are more than 50 years old. We haven’t established new explosive ingredients in a long time, and it’s caused us to fall behind as a country in the field of energetic materials. To catch up we need to be able to advance things from new chemistry all the way to a rocket motor very quickly. That’s what PSI is set up to do.”

One type of new material currently under development by PSI is binder ingredients for rapid curing propellants and energetics. These innovative materials have been developed through a Navy SBIR award. “Making propellants is kind of like

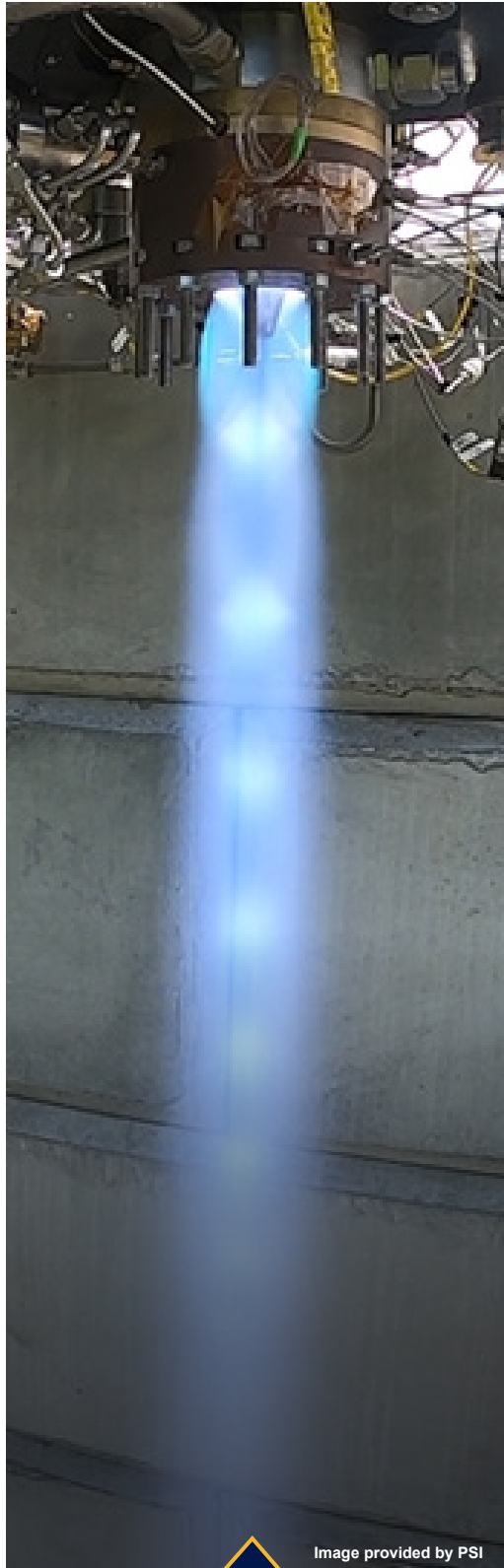


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The facility expansion will give PSI room to increase the scale of RDRE tests and allow for faster testing timelines.

baking a cake,” Wegener explains. “Holding it at elevated temperature turns it from a thick liquid into a solid, and the binder ingredient controls that process. We have a rapid curing binder that allows us to cure propellants in less than one day. Normally it takes a week.”

The company is also focused on developing rotating detonation engines and rotating detonation rocket engines (RDEs/RDREs), with three different programs underway for Navy, Air Force, and DARPA customers. RDEs/RDREs offer the DoD the potential to increase efficiency while reducing size, complexity and emissions.

PSI’s work builds on previously demonstrated RDE designs to develop innovations that address known thrust performance issues. According to Wegener, “Our RDE work started in the SBIR program and most recently we were awarded an Air Force non-SBIR contract to develop flight prototypes. Those will be delivered at the end of this calendar year. We expect that business will continue to be important and the new facility will give us more space for testing.”

PSI has a long history of successful SBIR participation, winning its first Phase I contract in 1983 just one year after Congress created the SBIR program. Since then, SBIR/STTR funding has played an instrumental role in the company's growth. For every dollar of Phase II funding PSI has received, the company has secured three times that amount in Phase III awards.

"SBIRs and STTRs have been vital in helping PSI deliver what the government is looking for. The majority of the products and technologies we've commercialized originated as SBIR programs, where the government had a new need and that need was communicated to us through an SBIR solicitation. PSI's technical staff is eager to find innovative solutions for those needs, whether by developing novel science in-house or by integrating technologies from academia into meaningful systems. These programs have played a big part in our growth."

PSI markets its energetics and propulsion technologies directly to the DoD, but also to other federal agencies and to larger defense contractors. "When we transition things out of the SBIR program, we become a provider for both the government and private contractors. Traditional prime contractors are looking for new technologies that they can pull into their system upgrades, and small businesses like PSI give them a way to do that with reduced risk."

Some of PSI's energetics technologies have limited commercial application beyond weapons systems, but for other technologies—such as liquid rocket engines—the space industrial base is a growing market, Wegener notes.

Many of PSI's SBIR/STTR projects have participated in the Navy SBIR Transition Program (Navy STP), which the company values both for the opportunity to showcase its

technology and as a professional development experience for its personnel, says Wegener. "Navy STP gives us another chance to put our technology in front of Navy program officers and prime contractors and more of those opportunities are always better. It allows us to put it in front of a lot of people all at once, which is a very good use of our time. That's why we keep coming back. PSI encourages program managers and technology leaders to go through the process, not just to get their technology out in front of a big group of potential end users, but also for the technology transition training that Navy STP provides."

Founded in 1973, PSI began transitioning company ownership to an Employee Stock Ownership Plan in the 2000s and has been entirely employee-owned since 2011, which Wegener sees as one of the company's strengths. "The longer I'm at PSI the more I see the value in working for an employee-owned company," he says. "We tend to work on the things that we believe in and want to work on rather than being controlled by a single owner or some larger entity. Employee-owned companies tend to have more emphasis and value placed on what people are creating rather than just quarterly financials."

From its founding, PSI's mission has been to invent, demonstrate, and translate technical solutions that support national priorities. The company's products span the defense, security, energy, environmental, healthcare, and industrial markets. For more information, see: www.psicorp.com.

