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NATIONAL SECURITY

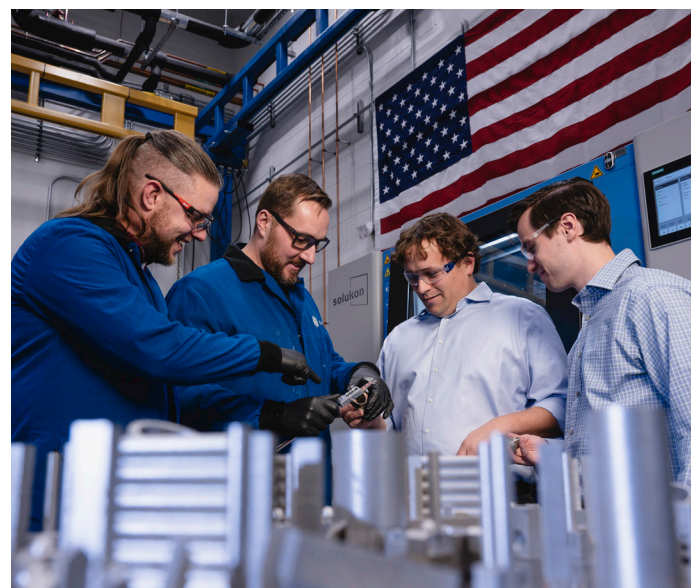


Purdue Applied Research Institute's (PARI) Hypersonics Lab builds out the hypersonic ecosystem at Purdue University. It meets a national need for advancing critical technology and accelerates the development timeline of technology from initial design to market entry in defense and commercial sectors.

The PARI Hypersonics Lab (PHL) will have a lasting, positive impact in defense. The technologies and tests conducted here will play a crucial role in strengthening national security, positioning PHL as an essential hub for hypersonic innovation.

PHL'S MAIN GOALS

- Propel innovation in advanced manufacturing techniques, modeling and simulation, and testing. These include the thermomechanical, environmental, high-speed propulsion, aerodynamic and aerothermodynamic fields.
- Train the next generation of the hypersonic workforce through hands-on experience in all stages of design, manufacturing and testing. Important introductions and networking within the industry will be highly emphasized.
- Bolster collaboration with industry and government by providing spaces to design and test novel technologies.



(TOP) Research Assistant Grant Dillel installs a model for a recent shot test of the HYPULSE shock tunnel at Purdue. The model is a 7-degree (half angle) cone with a 6-inch base and a length of 2 feet. The cone's sharpness gives a clean shockwave from which researchers can derive the speed of the flow. (BOTTOM) At HAMTC, Gregg Lubas, Nate Humbert, Nick Strahan and Will DeVerter discuss a 3D printer project. (Purdue University photos/Charles Jischke)



The Purdue Hypersonics and Applied Research Facility. (Purdue University photo/Charles Jischke)

THE HOME OF HYPERSONICS

PHL is in the 65,000-square-foot, state-of-the-art **Hypersonics and Applied Research Facility (HARF)**. HARF brings together designing, joining, manufacturing and testing under one roof.

Opened in 2023, the \$41 million HARF is an intentionally designed facility that can support classified research and protect sensitive intellectual property while enabling a flexible space for multiple stakeholder use. HARF brings together designing, joining, manufacturing and testing under one roof.

The Hypersonics Advanced Manufacturing Technology Center (HAMTC)

A single location at Purdue University for industry partners to work on materials and manufacturing innovations. HAMTC offers access to testing capabilities that reduce the time and cost of prototype development, provide innovations through academic engagement and transition hypersonic technologies to the defense industrial base.

The HYPULSE reflected shock/expansion tunnel

A high-enthalpy hypersonic tunnel that recreates the high-temperature, chemically active air flows characteristic of hypersonic flight. HYPULSE allows simulations at speeds ranging from Mach 5 to Mach 40. With access to higher Mach speeds and higher

temperatures, HYPULSE enables a whole new area of aerodynamic research.

The forthcoming Mach 8 Quiet Tunnel

This tunnel will offer a controlled environment to research several facets of high-speed flight. It will more closely simulate flight and provide more accurate data than conventional hypersonic wind tunnels. It will be the only wind tunnel of its type in the world.



Julio Hernandez, a HAMTC engineer, implements a refined grinding and polishing regimen, crafting mirror-like finishes that reveal the intricate details under the lens of optical microscopy. (Purdue University photo/Charles Jischke)