

PERL: Expanding Propulsion and Energetics Research Capabilities at Texas A&M University

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Abstract

Historically, conducting research with components of propulsion and power generation systems has presented significant logistical challenges. Typical experiments involve a combination of high pressures, high kinetic energy, hot exhaust products, and hazardous chemicals. These factors greatly complicate the process of conducting safe and effective experiments at the university level, even as the demand for such research continues to grow. To address these challenges, the TEES Turbomachinery Laboratory at Texas A&M University has constructed a new, 7,000-square-foot facility: the Propulsion and Energetics Research Laboratory (PERL). The PERL features seven blast-rated test cells, a centrally located laser diagnostics room, two control rooms, a wet chemistry lab space, and a space for experiment buildup. Each test cell is equipped with remote camera monitoring, high-pressure gas hookups, and built-in floor anchors. Four cells are fitted with bay doors to allow hazardous exhaust products to be directed toward an external concrete barrier. The fourth room is a 60-foot-long cell designed to host shock-tube experiments and other large-scale testing. Windows connect each test cell to the laser diagnostics room, enabling optical access while isolating equipment from hazardous testing environments. Dedicated control stations allow users to trigger and monitor experiments, collect data, and analyze results remotely. Additional facility features include a fabrication bay, wet lab, and magazine storage for energetic materials. The PERL provides a dedicated environment for academic, industry, and government partners to conduct experiments that address needs in propulsion, combustion, power generation, and energetic materials research.