



◀ The Propulsion Research Center's wind tunnel team with during its construction at Johnson Research Center. From left, graduate student **Warren Buzzard**, **Dr. Phillip Ligrani**, undergraduate **Daniel Corey**, undergraduate **Benjamin Shea**, undergraduate **Andrew Miller**, graduate student **Benjamin Lund**, undergraduate **Patrick McIntertrt** and laboratory engineer **Tony Hall**.

started life as rocket fuel storage but now are used in conjunction with a fifth tank to provide 50 cubic meters of compressed air storage at supply pressures up to 2,500 pounds per square inch.

Air from the tanks is routed through pressure regulating valves to two wind tunnels that are slightly larger than washing machines, where it rushes past objects under research in the 9.6-inch by 4-inch test bed chambers and then is exhausted outdoors through a noise reduction baffle system.

"An elaborate valve system controls the flow," Dr. Ligrani says. "This will ensure high enough flow rates and pressures to reach the required supersonic speeds."

The project was awarded \$249,810 by the Alabama Innovation Fund, supplemented by investment from UAH's Office of the Vice President for Research and Economic Development.

"The state of Alabama provides an excellent and unique environment for the development of advanced research efforts, which are tied to important and vital economic activities, and benefit the scientific and engineering communities, not only for the Huntsville area, but for the entire state," says Dr. Ligrani. "We are likewise very grateful to the UAH Office of Research and Economic Development for the generous supplemental support we received for this project. I am also grateful to the Propulsion Research Center and the Department of Mechanical and Aerospace Engineering for the outstanding support provided to this and to related efforts since my arrival at UAH in August of 2014." ■

## CAPABILITIES PLACE UAH IN ELITE UNIVERSITY GROUP

A new \$2 million wind tunnel system at The University of Alabama in Huntsville (UAH) is soon to be operational and involved in research.

Championed by the university's eminent scholar in propulsion, Dr. Phillip Ligrani, who also oversaw its construction, the TranSonic/SuperSonic/WindTunnel or TS/SS/WT resides in the Air Breathing Test Cell at UAH's Johnson Research Center and makes UAH one of a handful of universities nationwide with such capabilities.

"In the near future, following a couple of days of testing, we are expecting to achieve our initial goal of creating a supersonic flow at Mach 1.6, with a supersonic shock wave," Dr. Ligrani says.

Test sections of the facility reach speeds and air velocities ranging from Mach 1.6 with an airspeed of approximately 1,230 miles per hour to Mach 3

with an airspeed of about 2,300 mph, says Dr. Ligrani, the project's principal investigator and a professor of mechanical and aerospace engineering.

Test applications include supersonic engine intakes, scramjets and hybrid space vehicles and components.

"We received excellent support from UAH building services in developing and installing the various structures needed to support the wind tunnel," says Dr. Ligrani. "Piping Machine Specialties Corp. in Salt Lake City worked closely with us to manufacture various parts and components needed for the installation."

Four 14-foot-long tanks valued at \$1 million and weighing 16 tons each were donated to the university by the U.S. Air Force's Arnold Engineering Development Center in Manchester, Tenn. The tanks