Whether it’s shaving fractions of a second off a Formula One car’s lap time, squeezing more power out of the next green-energy wind turbine or improving the efficiency of tomorrow’s high-endurance and high-speed air vehicles, Texas A&M aerospace engineering research has expanded into one of the nation’s most diverse and integrated experimental aerodynamics facilities.

The Department of Aerospace Engineering at Texas A&M has a long history dating back to 1912. But it is the program’s recent period of rapid growth that is garnering attention, including the addition of research aircraft and several wind tunnels that provide speeds ranging from 80 mph to more than Mach 6.

“Any one of the testing facilities we operate would be the jewel in another department’s crown,” says Associate Professor Ed White. “That we have so many and that they operate in a integrated way with so many students and professors puts Texas A&M’s aerospace engineering department miles ahead of any other department in the country. We operate almost at the level of a mini-national laboratory.”

Much of the recent growth in experimental facilities began with a faculty reinvestment program at Texas A&M that brought several prominent researchers to the department, each with its own specialty. In addition, five smaller academic and research wind tunnels are operating in the H.R. Bright Building on Texas A&M’s main campus.

Faculty and student researchers and industry alike benefit from having in one location flight-testing facilities with subsonic, supersonic and hypersonic wind tunnel facilities, each with its own specialty. In addition, five smaller academic and research wind tunnels are operating in the H.R. Bright Building on Texas A&M’s main campus.

The Facilities at a Glance

1. The Klebanoff-Saric Wind Tunnel is one of only a few low-speed, low-disturbance wind tunnels in the world. It can generate test section speeds of up to 70 mph with very low turbulence intensities over the full speed range of the tunnel, making it an ideal platform for boundary-layer stability and transition experiments.

2. The Oran W. Nicks Low Speed Wind Tunnel offers low-speed wind tunnel testing for both academic and commercial users for test engineering, model fabrication and data analysis. With a large test section measuring 7 feet by 10 feet and flow velocities up to 280 mph, the wind tunnel is a versatile platform for testing a wide variety of models from aircraft to missiles, racing bicycles, semi trucks, wind turbines, offshore oil platforms and more.

3. The Flight Research Laboratory operates two aircraft as flying wind tunnels, where researchers study the transition process on specially designed test models mounted to the aircraft and flown under real-world flight conditions. A Cessna Skymaster is the workhorse of the laboratory, with its dual-engine configuration and external stores pylons for the heavy lifting of test models, instrumentation, two flight crews, and a graduate student flight test engineer. A high-performance motor glider offers ultra quiet flight without engine noise for the purest flight test environment. Research is funded through the Air Force Office of Scientific Research (AFOSR) and the Air Force Research Laboratory (AFRL).

4. The Mach 6 Quiet Tunnel, originally part of NASA Langley Research Center, is one of only two wind tunnels in the world that can support fundamental research into boundary-layer stability at hypersonic speeds in a low-disturbance environment. Research is supported by the Texas A&M–led National Center for Hypersonic Laminar-Turbulent Transition Research. This five-year program, funded by AFOSR and NASA, integrates the efforts of four universities to enhance the fundamental understanding of the hypersonic transition process and its dependence on chemical reactions, ablation, surface roughness and more.

5. The National Aerothermochemistry Laboratory is home to several high-speed wind tunnel facilities. The Supersonic High Reynolds Number (SNR) tunnel is a small-scale supersonic tunnel that enables fundamental research into the effects of roughness on the turbulent boundary layers on vehicles at speeds of Mach 2, 3 or 5. The Adaptively Controlled Expansion Tunnel is a larger hypersonic facility that operates interchangeably with the Mach 6 Quiet Tunnel and offers speeds of Mach 5–8.

6. The Land Air and Space Robotics (LASR) Lab conducts research in robotic sensing and control with an aim to enhance the fields of proximity operations, human–robot interaction, stereo vision, swarm robotics and autonomous aerial vehicles. The indoor robotics arena is the centerpiece of the lab, offering 2,000 square feet of flat floor for ground robots. Twelve-foot ceilings give aerial vehicles plenty of room to maneuver. Project funding comes from AFRL, the U.S. government, NASA and Boeing Co.