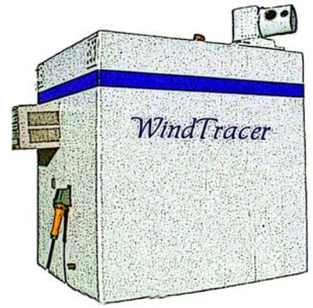
Just as a ship leaves a wake behind it in the sea, an aircraft leaves a wake in the air. The rapidly swirling air in a wake can catch the wings of nearby aircraft, with potentially disastrous results. Because of this danger, air-traffic controllers provide adequate spacing between aircraft—a procedure that ultimately reduces an airport's capacity. Here is a product that could allow aircraft to fly closer together to ease airport congestion.

WindTracer®

How It Helps: The WindTracer Coherent Doppler Lidar system detects dangerous air currents created by large commercial aircraft. It helps pilots avoid dangerous patches of air. Air-traffic controllers can direct traffic more efficiently by knowing immediately when it is safe to send another plane down a runway or allow one to land. By optimizing take-offs and landings, airport capacity and flight safety can be increased. Without technology to monitor wake vortices, pilots and air-traffic controllers must rely on experience and educated guesses to determine how to avoid or cope with wind turbulence near airports. Carried aboard aircraft, WindTracer can let pilots at cruising altitudes know the location of nearby areas of air turbulence, allowing them to find a more favorable cruise altitude that will improve flight safety and fuel efficiency.

How It Works: WindTracer measures wind direction and speed using pulsed laser energy at an eye-safe wavelength (in the range of 1 to 2 microns). The system bounces the energy off dust particles or aerosols in the air. It then records and processes the backscatter from particles in real time. Wind direction is determined by scanning an area multiple times from multiple angles. Wind speed is measured by comparing the Doppler frequency shift of backscattered energy with the frequency of the released laser energy.



How Much It Will Cost: A typical installation of the system at an airport can run from $750,000 to $1.2 million.

When It Will Be Ready: The product is ready and in use now. WindTracer has provided forecasters at Hong Kong International Airport with high-resolution images of the windshear and turbulence environment at the airport. The airport is near a large mountainous island that sometimes causes windshear and turbulence. Other wind hazards arise due to sea breezes. The customer for the WindTracer in Hong Kong is the Hong Kong Observatory. The Federal Aviation Administration also is using WindTracer to support its Wake Turbulence Research Program, which is focusing on improving capacity at airports.

Who Is Working On It: The product was developed by CLR Photonics, the commercial products division of Coherent Technologies, Inc. (CTI). CTI develops and manufactures laser radar systems for military and commercial customers. Founded in 1984 by Milton Huffaker, the company currently employs 150 people and occupies a total of 40,000 square feet of leased space in Lafayette and Louisville, Colorado. For more information, contact Paul Reveley of CTI at (303) 604-2000 or paulr@ctilidar.com. The company Web site is www.ctilidar.com.

MDA Origins

From 1989 to 2002, CTI received 12 BMDO and MDA SBIR Phase I awards to develop laser-based technologies for missile tracking, discrimination, and kill assessment. For example, the technologies could be used to discriminate between real and decoy warheads released in the mid-course portion of a ballistic missile's trajectory. One notable research effort sought to improve the range of current lidar tracking systems, which would allow MDA to reduce the total number of sensor-monitoring and missile-interceptor platforms.