UC discoveries could help quiet the world's cities

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They're sleek. They're fast. They're powerful. And, they are deafening. Furthermore, those Top Gun military jets need to be up in the air in the wee hours – over land – to simulate their landings on aircraft carriers. But innovations out of the University of Cincinnati's Gas Dynamics and Propulsion Laboratory are showing promise in reducing the intense noise of these supersonic jets without impacting their power. It's research that can help neighborhoods slumber a little more soundly, keep their windows rattling a little less loudly and also protect the hearing of military personnel.

Research by Jeff Kastner, a research professor in the UC College of Engineering and Applied Science (CEAS), will be presented Aug. 21 at INTER-NOISE 2012, the 41st International Congress and Exposition on Noise Control Engineering, in New York City. Kastner will present on UC discoveries that use chevrons and fluidic injection to reduce supersonic jet noise.

Kastner's research, supported by funding from the Office of Naval Research, is examining chevron technology developed at UC that has, in part, been commonly used in the commercial aviation industry to reduce noise on jet engines.

Chevrons – serrations on the exhaust side of a jet engine – are becoming more popular in commercial aircraft. They control the turbulence and resulting noise coming from the high-speed flow as it exhausts from the jet engine.

Kastner says the velocities of exotic military planes are much higher than commercial aircraft, which is the main reason they're so much louder. Since chevrons can result in some fuel loss when controlling turbulence, Kastner's research is testing fluidic technology to enhance the performance of chevrons for high-power military jets. He explains that since the planes only need the noise reduction during takeoff, his lab is exploring a chevron/fluidic injection system that can be turned on during takeoff and turned off when the plane is in the air, eliminating fuel loss.

"We are in the business of trying to quiet planes without impacting their fuel efficiency," says Kastner.

Kastner says he and fellow researchers in UC's Gas Dynamics and Propulsion Laboratory are testing multiple concepts that manipulate the turbulence in the jet exhaust to examine how those changes impact the sound field. That's because noise is a byproduct of the turbulence, and so manipulating the turbulence can make it less efficient at producing noise.

The short-term goal of the UC research is to reduce noise by 3 decibels while ultimately reducing noise 10 decibels or more.

UC's Gas Dynamics and Propulsion Laboratory is housed in the UC College of Engineering and Applied Science (CEAS), home of nearly 200 years of engineering innovation.

Provided by University of Cincinnati