

Researchers Working to Keep Airliner Air Quality Healthy, Safe

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In a tightly enclosed area, such as an airplane, the quality and safety of the air is of utmost importance. In addition to concerns about general air quality, added recent concerns have included accidental contamination of aircraft cabins -- such as with pandemic flu -- and deliberate contamination with biological agents -- such as anthrax -- as part of a terrorist attack.

Kansas State University is part of a federally established center to examine air quality in aircraft cabins and assess chemical and biological threats in airliners. The Air Transportation Center of Excellence for Airline Cabin Environment Research, established by the U.S. Department of Transportation's Federal Aviation Administration, also has as partners Auburn University, Purdue University, Harvard University, Boise State University, the University of California at Berkeley and the University of Medicine and Dentistry of New Jersey.

Byron Jones Byron Jones, director of K-State's Engineering Experiment Station and professor of mechanical and nuclear engineering, heads up K-State's efforts for the center. He said the center's projects are all collaborations among the eight institutions. Jones, pictured at left, said the center's mission is to address air issues, ensuring air travel is healthy, and at the same time, keeping it economical. In addition, the center is examining safety during deliberate attempts to contaminate the air in-flight.

"Although the science is similar with both of these missions, the

application is different," Jones said. "Our job is to protect the environment as best we can -- detect, protect and clean up after it. Whether an air incident is deliberate or accidental, the idea is the same and both are important."

The center was established in 2004 and since that time, the institutions have begun various projects to understand and mitigate environmental health issues on airplanes, including looking into abnormal incidents where a plane's air supply has been contaminated with engine oil or hydraulic fluid, for example; how cabin pressure affects passengers, especially those with cardiopulmonary problems, as well as flight attendants and pilots who work in the environment daily; seeing how elevated ozone levels at higher altitudes affect the cabin environment; creating a database on the in-flight air environment; looking at the basic science of how contaminants travel about the cabin; what sensors will best detect certain things in cabin air; and the best strategies to decontaminate an airplane.

"How do you deal with an intentional attack if the attack is invisible -- that is, what if somebody is releasing something into the cabin environment that cannot be seen -- how can we even detect it? This is one of the things we're looking at," Jones said. "Air travel is the mass transportation medium for long distances in North America," Jones said. "And yet it's conducted in an 'alien' environment -- the outside environment at typical flight altitudes is very hostile to human habitation. While in an aircraft, we depend on the aircraft and its environmental control system for safety.

"If you have an incident on an airline, it will have a huge negative impact on the entire industry, and the particular airline specifically," he said. "If the airline has a secure environment and knows how to deal with these factors if they arise, it will have less of an impact."

Jones said air quality on planes has been a concern since the 1980s when a study by the National Research Council mandated planes go non-smoking, among other recommendations. However, no funding was put into place to follow up on the additional recommendations. Another National Research Council study, on which Jones served in 2001, led to more recommendations. Coincidentally, that report came out around Sept. 11, 2001, when air safety also was being brought to the forefront. Two mandates came from Congress to the Federal Aviation Administration to address both air quality and safety, and they were combined into funding to begin K-State's Center of Excellence.

Jones and other K-Staters have been studying transportation environments, including automobiles, aircraft, trains and buses, for more than 15 years through the university's Institute for Environmental Research, the longest standing research institute on the indoor environment in the world. Jones also has been working with the American Society of Heating, Refrigerating and Air-Conditioning Engineers to help develop an air quality standard for the airline industry for more than 10 years.

"An efficient, high quality and safe air transportation system is absolutely essential for this country," Jones said. "The Air Transportation Center for Airline Cabin Environment Research will play an important role in meeting this need. K-State has joined a team of the very best scientists and research programs to help make a safer air transportation system possible."

The center has received approximately \$10 million in funding to date through the Federal Aviation Administration. After three years, the center will be reviewed and its work assessed.

Other K-Staters who aid in center research include mechanical and nuclear engineering faculty members Mohammad Hosni, professor and

head of the department; Steve Eckels, associate professor and director of the Institute for Environmental Research; Kirby Chapman, professor and director of the National Gas Machinery Laboratory; Terry Beck, professor; and Charlie Zheng, associate professor.

Source: Kansas State University

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