

Rod Bogue

International Aircraft Fire & Cabin Safety Research Conference

Title: Progress and Status of Turbulence Warning System Technology

Abstract

Over the past four years, various groups and organizations have investigated airborne turbulence encounters to better understand the characteristics of the turbulence hazard in terms of the impact to the aviation community, the weather situations that initiate turbulence, and the physical effects on aircraft and occupants. In addition, approaches have been developed to reduce the hazard to aircraft crews and the traveling public. Turbulence warning technology is a part of this approach, and developmental testing has been accomplished during this time. To better understand the warning time requirements, a cabin exercise is being planned that is designed to identify the time required to prepare an aircraft cabin for a turbulence encounter. All of these activities will be reviewed to provide an update on the aircraft turbulence encounter hazard problem, the recent results of warning technology testing, and a perspective on the timing of the operational readiness of the elements of the risk reduction approach.

Turbulence warning technology is being pursued on two fronts, namely through enhanced weather radar and a near-infrared lidar whose concept of operation is very similar to the weather radar. Flight-testing of the radar has included 25 hours of flight time in the November-January 2000 time frame with further testing planned for November-January 2001. Fifteen hours of lidar flight-testing was begun in April-May 1998 with an additional 85 hours in the August-September 2001 time frame. How the two technologies may be used to provide interlocking coverage to increase the probability of detection and warning. Wind fields at ranges between 3 and 7 miles ahead of the aircraft were measured and the subsequent aircraft penetration of the measured regions assessed the turbulent conditions by measuring the resulting aircraft motion. Moderate and light turbulence was encountered as well as a variety of atmospheric aerosol concentrations and moisture content conditions.