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Agenda Item 8: Flight Safety Perspectives

AIRFIELD SAFETY IN THE UNITED STATES

(Presented by the United States)

SUMMARY

The biggest safety challenge to aviation is not in the air but on the ground. Improvements in procedures and the introduction of new technology can improve runway safety. This paper discusses how the United States Federal Aviation Administration (FAA) places a high priority on improving airfield safety and how, in partnership with industry, airport operators, and air traffic controllers, it has implemented many changes to reduce the risk of runway incursions.

1. INTRODUCTION

1.1 The FAA regards safety as its first priority. The biggest safety challenge is not in the air, but on the ground at hundreds of commercial service airports. Both runway incursions and runway overruns pose a threat to passengers, crews, and airport workers that can cause significant damage to aircraft and infrastructure.

1.2 An aggressive and effective runway safety program has reduced the number of serious runway incursions in the United States by 63 percent from fiscal year (FY) 2000 through FY2008. Through September 2009, all categories of runway incursions were down significantly as compared to the same period in FY2008. Although this is encouraging, there is still much work to be done.

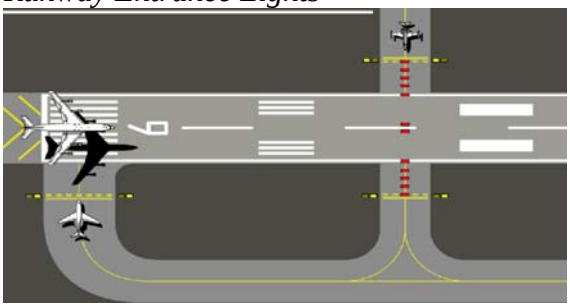
1.3 For many years, the United States has actively invested in programs and technology to address airfield safety. We continue to deploy the Airport Surface Detection Equipment, Model X (ASDE-X) while pursuing newer technologies such as Runway Status Lights, Final Approach Runway Occupancy Signal (FAROS), low-cost ground surveillance systems, and Airport Moving Maps. Changes to airport infrastructure and procedures have also been implemented, such as enhanced taxiway markings, improvements to runway safety areas (RSA), and increased training. In the human factors arena, changes have been made in policies for issuing taxi instructions and takeoff clearances, and a voluntary reporting system for air traffic controllers has been developed.

2. **DISCUSSION**

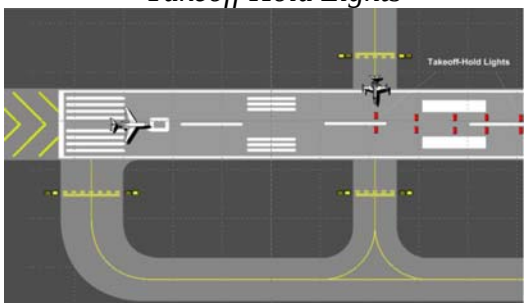
2.1 To improve controller situational awareness on the airport movement area at the busiest U.S. airports, the FAA has installed ASDE-X ground surveillance systems at 21airports. ASDE-X screens show controllers aircraft on a continuously updated color display map, where they are able to spot potential collisions. An additional 14 systems are scheduled to be installed by Fall 2010 – one year earlier than originally anticipated.

2.2 Runway Status Lights are a fully automated system that integrates airport lighting equipment with surveillance systems to provide a visual signal to pilots and vehicle operators when it is unsafe to enter or cross a runway (Runway Entrance Lights) or begin takeoff roll on a runway (Takeoff Hold Lights). Airport surveillance sensor inputs are processed through light control logic that command in-pavement lights to illuminate red when there is traffic on or approaching the runway. Runway status lights have been successfully demonstrated at Dallas-Fort Worth and San Diego airports. Another demonstration system has been installed at Los Angeles World Airport. The developmental systems have proven successful and the FAA is moving ahead with installing FAA runway Status Lights production systems. The following 22 airports will have Runway Status Lights by the end of 2012: Atlanta; Baltimore Washington International; Boston; Charlotte, NC; Chicago O'Hare; Dallas-Fort Worth; Denver; Detroit; Washington Dulles; Fort Lauderdale; Houston Intercontinental; John F. Kennedy; LaGuardia; Las Vegas; Los Angeles; Minneapolis; Newark, N.J.; Orlando, Fla.; Philadelphia; Phoenix; San Diego; and Seattle.

Runway Entrance Lights



Takeoff Hold Lights



2.3 The FAA is also testing the FAROS system, which provides immediate information to pilots on approach that the runway is occupied or otherwise unsafe for landing. The FAROS system determines occupancy of the runway by detecting aircraft or vehicles on the runway surface. If a monitored area on the runway is occupied, FAROS flashes the Precision Approach Path Indicator Lights (an existing system) to alert the pilot that it is potentially unsafe to land. The system is being tested at both Dallas-Fort Worth Airport and Long Beach/Daugherty Field Airport.

2.4 Additionally, the FAA is evaluating the use of low-cost, commercially available radar surveillance systems that would reduce the risk of runway incursions at certain small and medium-sized airports that are currently not programmed to receive ASDE-X. The first contract to install and test a low-cost ground surveillance system (LCGS) was awarded in January 2009. The contractor will deliver, install and test a ground surveillance system at airports chosen by the FAA. The LCGS pilot program aims to evaluate the maturity, operational suitability and cost-effectiveness of commercially available ground surveillance products. Consistent with the FAA's continued emphasis on runway safety improvement, runway incursion history was a key factor in selecting the four airports (Long Beach, San Jose, Reno, and Manchester) The agency selected multiple companies for these tests in order to evaluate the different alternatives. Testing is expected to last from one to three years.

2.5 Industry has developed avionic products that may further enhance aircrew situational awareness. To facilitate operational assessment of these options, the FAA reached agreement with seven U.S. airlines to fund in-cockpit runway safety systems in exchange for critical operational data. The selected airlines will equip their aircraft with surface moving maps with own-ship position on an Electronic Flight Bag for flights to or from 21 test bed airports. The data gathered will help the FAA evaluate the safety impact of this technology and is expected to accelerate key safety capabilities necessary for the transition to our Next Generation Air Transportation System. Each agreement will remain in effect through September 2011.

2.6 The FAA has continued to make progress in improving Runway Safety Areas (RSAs), which enhance safety in the event of an undershoot, overrun, or excursion from the side of the runway. Since a program was started in FY00 to accelerate RSA improvements for commercial service runways, 74 percent of those improvements have been completed. Twenty-eight airports accomplished their improvements by installing Engineered Materials Arresting Systems (EMAS), a bed of crushable concrete placed at the end of a runway to absorb the forward momentum of an aircraft. The EMAS technology provides safety benefits in cases where land is not available or where it would be very expensive for the airport sponsor to buy the land off the end of the runway. This technology is now in place at 41 runway ends at 28 airports with plans to install 15 additional EMAS systems at nine additional airports. EMAS has also been installed internationally at Sichuan Province, People's Republic of China and Madrid, Spain. To date, there have been four incidents where the technology has worked successfully to keep aircraft from overrunning the runway and in several cases has prevented injury to passengers and damage to the aircraft.

Saab 340 overrun at JFK, May 1999

Falcon 900 overrun, Greenville, SC, July 2006

2.7 All U.S. airports with enplanements of 1.5 million or more (75 airports) were required to install enhanced airport markings by June 30, 2008. All 75 airports completed the marking upgrades in advance of the deadline. Medium-sized airports must install the markings by December 2009 and small airports by December 2010. To date, 91 percent and 61 percent of those airports, respectively, have completed their installations. In addition, roughly 98 percent of all commercial service airports currently have or plan to provide recurrent training for all who have access to the aircraft movement area.

Previous Taxiway Centerline Markings

Enhanced Taxiway Centerline Markings

2.8 Re-examining air traffic communications offers potential to improve surface safety. After conducting a risk analysis, the FAA implemented a requirement for controllers to issue explicit taxi instructions in May 2008. In August 2008, the requirement for an aircraft to cross all intervening runways prior to receiving a takeoff clearance was implemented. Three other changes are under consideration – adoption of the ICAO phraseology "line up and wait" instead of the currently used "position and hold"; the requirement for a pilot to receive a clearance to cross every runway; and the requirement to clear an aircraft to land only after the preceding aircraft has crossed the landing threshold.

2.9 The FAA, working with our Air Traffic Controller's union, has begun phased implementation of a voluntary reporting system for air traffic controllers. The program is currently implemented at 220 facilities, giving over 12,000 controllers access. This system offers individual controllers an opportunity to provide valuable information that can be used to target safety risks that may not have been identified through existing audits, inspections, and automated tools. So far, the program has received more than 6,400 reports, identified several deficiencies, and notes safety issues for further evaluation and corrective action.

2.10 The FAA has developed standards for end-around taxiways, which can keep aircraft from having to cross runways being used for takeoffs and landings at the busiest airports. A new end-around taxiway at Atlanta, which is operational, eliminated approximately 700 runway crossings per day. Another end-around taxiway opened at Dallas-Fort Worth in December 2008, and the airport expects to construct more in other quadrants of the airfield. The FAA also encourages operators to build perimeter roads around the airfield so that vehicles do not have to be driven across taxiways and runways.

2.11 The FAA formed a joint FAA-Industry Runway Safety Council in October 2008 to explore the root causes of runway incursions. The Council is comprised of representatives from various parts of the aviation industry. A working group integrates investigations of severe runway incursions, conducts a root cause analysis, and then presents its root cause analysis to the council. The working group also makes recommendations on ways to improve runway safety, which the council considers. If accepted, these recommendations are assigned to the part of the FAA and/or the industry that is best able to control the root cause and prevent further runway incursions. The Council tracks recommendations to make sure appropriate action is taken.

3 CONCLUSION

3.1 The FAA is implementing a number of new technologies and procedures to improve Runway Safety and reduce runway incursions. These include improved ground surveillance radars, enhanced taxiway centerline markings, installation of runway status lights, and utilization of EMAS arresting systems.

3.2 The FAA can provide additional details and specifications of these systems to States in the region that may be interested in using these proven systems at airports in their respective country.

4 ACTION BY THE CONFERENCE

4.1 The Meeting is invited to:

a) note the contents of this paper, and

b) consider implementing some or all of the technologies and processes above to reduce the risk of runway incursions on their airfields.

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