



DEPARTMENT OF MECHANICAL ENGINEERING Purdue School of Engineering and Technology

FALL 2002 SEMINAR SERIES

Date: **Thursday, November 21, 2002**

Time: **11:00 am - 12:00 pm**

Room: **ET 202**

Reception at **10:45 am (cookies and coffee served)**

Everyone is invited

Design of Flight Deck Doors on Transport Category Airplanes

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Following the events of September 11, 2001, the airline industry, airframe manufacturers, and the FAA faced an enormous challenge and a growing public pressure to increase the aircraft flight deck security systems. The importance of expediting the installation of strengthened flight deck doors to prevent, or at least delay, entry of unauthorized persons into the flight deck have become the number priority on FAA's agenda.

On November 19, 2001, the United States Congress enacted a Public Law, the Aviation and Transportation Security Act, henceforth referred to as the Act. The Act required the FAA to issue requirements to improve flight deck integrity, specifically the strengthening of the flight deck door. Concurrently, the FAA also issued an amendment, that requires the transport operators that are required to have flight deck doors, and cargo operators with flight deck doors installed on that date, to strengthen these doors. Flight deck doors on these airplanes must meet these new requirements by April 9, 2003.

The challenge for the aircraft engineering community within 18 months of Sept 11, 2001 was to design, certify, and install the new doors for 6000 domestic aircraft or face the possibility of many grounded airplanes, creating an enormous economic impact.

American Trans Air, the nations' 10th largest air carrier, began its fortified cockpit door initiative by closely studying the flight deck area of the various commercial aircraft currently operating in our fleet. We needed to understand the different types of doors that were in use, while formulating the best way to strengthen them in order to prevent an unwanted person from gaining access to the flight deck. Our first course of action was to develop a **Design Philosophy**, and we arrived at the following:

- **ATA doors will share common material construction & mechanisms**
- **All Doors will meet current and new FAA requirements**
- **Our design will permit easy manufacturing**
- **Retrofit installation will be simple**

Before embarking on a new design, our core technical team was tasked to determine if existing doors could be modified to give them added strength. Initially, the concept of applying ballistic material to the flight deck side of the door seemed logical. However, when the dynamic loads associated with a 300 joule impact were analyzed and the FAA declared that decompression and emergency rescue and escape requirements would not be relaxed, we knew that adding one or more "band aids" to the door would not be a comprehensive solution. In other words, we needed to design a new door.

At this point, ATA worked to achieve our **design philosophy** with a new door design. We began with the goal of designing it to be easily interchangeable with the existing door. From a high level perspective, door thickness was a key element. In order to achieve similar operating characteristics as its predecessor, we concluded that our new doors would be the same thickness as the existing doors.

Currently, we are in process of completing our design and expected to begin installations prior to FAA's deadline of April 9th, 2003.