



הטכניון – מכון טכנולוגי לישראל  
הפקולטה להנדסת אוירונאוטיקה וחלל



**Technion – Israel Institute of Technology  
Faculty of Aerospace Engineering**

Seminar is jointly hosted by:  
Faculty of Aerospace Engineering Seminar Series  
Israel Society of Aeronautics and Astronautics

**Countering Threats against the Structural Integrity of Aircraft**

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Israel Aerospace Industries

This lecture traces the evolution of the fatigue life regulations in their aim to counter various threats to the structural integrity of aircraft.

The early history of aircraft structural failures is reviewed and current methods for designing and certifying aircraft for adequate fatigue life are discussed. Several historical structural failures are then reviewed and are classified into five threat categories:

1. Conceptual failures: Comet and B-707 at Lusaka
2. Unanticipated structural damage: F-111, DC-10 at Sioux City and B-777 Main Landing Gear
3. Improper repairs or servicing: DC-10 at Chicago, B-747 Japan Air Lines, Grumman Mallard and B-747 China Airlines
4. Improper manufacturing and quality-control: F-15C
5. Aging aircraft (MSD and WFD): B-737 Aloha Airlines

Actual examples of each of the five threat categories are discussed, as shown above.

It is shown that the original FAA civil damage-tolerance regulations (*prior to amendment 96*) have a *potential capability* in dealing only with the first and partially with the second threat category.

Recent changes to the FAA civil regulations (WFD, FAR-26 and LOV) are then reviewed. It is shown that the updated damage tolerance concept has a *potential capability* to deal with all the threats except for *landing gear unanticipated structural damage* and *improper manufacturing and quality-control*, the latter of which remains the manufacturer's responsibility.

Fatigue testing requirements are reviewed and recent rapid decompression incidents involving Qantas and Southwest Airlines are presented.

The lecture concludes with a discussion on the increased use of composite materials for primary structures of civilian aircraft. Since advanced composite materials are very sensitive to both impact damage and adverse environmental conditions, it is concluded that it is very difficult to predict how well composite material primary structures will resist both these threats as the aircraft age.

The talk will be given in English

Wednesday, 16.10.13

at 16:30 (gathering at 16:00)

Classroom, ground floor, library, Aerospace Eng.

Light refreshments will be served before the lecture

הזמנה זו מהווה אישור כניסה לטכניון

This invitation permits entrance to the Technion