KUWAIT AIRWAYS

FLIGHT SAFETY

AN IN-HOUSE NEWSLETTER OF OPERATIONS DEPT.

Vol.3, No.1 Flight Safety & Quality Assurance Division January 2008

In this issue

NEWSLETTER TEAM

Capt. Shawki Al-Ablani

Dr.M.S.Rajamurthy

Contact:

Flight Safety & Quality Assurance Division,

Operations Dept.

P.O.Box.394,

Safat 13004 Kuwait

Phone: +965- 4725475

Fax: +965- 4749823

E mail:

kwioeku@kuwaitairways.com

FLIGHT SAFETY/AIRCRAFT ACCIDENT LINKS

kacops.kuwaitairways.com

www.flightsafety.org

www.ntsb.gov

www.bea-fr.org

www.bst.gc.ca

www.bfu-web.de

www.aaib.gov.uk

www.atsb.gov.au

Editorial

We wish our deck crew and readers a very happy and successful new year. Let us make the new year another safe year for KAC.

Last two years have seen many runway overrun fatal accidents. If only these were prevented many lives could have been saved. These accidents re-emphasize the need for establishing Runway End Safety Areas (RESA) at airports with airline operations. Alternately, a protection system which effectively arrests the aircraft and prevents runway overruns could be considered. This system called Engineered Materials Arresting Systems (EMAS) is already in place in many airports in USA.

In this issue, we revisit the runway overrun accidents and look into strategies available on ground to prevent them. Both RESA and EMAS are discussed.

Lithium batteries which are very popular in electronic gadgets present an in-flight fire risk. We have a brief on this.

Your feedback is valuable. Suggestions and contributions can be sent to our office. Happy reading and many more safe landings.

Runway overrun accidents

Dr.M.S.Rajamurthy

On November 9, 2007, **Iberia Airlines Flight IB6463** an **A340-600** arriving from Madrid, Spain with more than 330 passengers and crew on board, ran off the end of a runway at Mariscal Sucre airport in Quito, Ecuador. The aircraft was badly damaged but no one was seriously injured.

The airplane landed at 17:15 with light rain and wet runway. According to airport officials in Quito, one or more of the tires on the aircraft's main landing gear burst when it touched down. As the aircraft slid down the runway, the landing gear partially collapsed. The huge aircraft came to rest in an area of grass and sand at the end of the runway on which it had landed. As it hit the grass one of the main landing gears tore off, the aircraft sank into the grass hitting part of the underground tunnel structure, ripping and blowing up other tires making the plane stop. The aircraft was leaning to port and resting on the nacelles of the number one and number two engines, which were badly damaged. The number three engine was also disturbed (See the pictures below).

Passengers and crew evacuated the aircraft using inflatable slides on the starboard side of the aircraft. The accident caused the airport to be closed for some time. The A340 is the largest aircraft type authorized to land at Quito.

In contrast, on July 17, 2007 a TAM Linhas Aereas Airbus A320-233 on a scheduled passenger flight from Porto Alegre to Sao Paulo's intercity Congonhas Airport, crashed during landing in rainy weather conditions killing all 176 onboard. The Airbus overran the wet runway, crossed a highway,

and impacted a hangar. The aircraft and hangar were both engulfed in flames, and totally destroyed. The weather had been bad for much of the day and there had been persistent, heavy rain in the two hours preceding the accident.

In 2007, there were two more fatal runway overrun accidents -one in Indonesia and other in Thailand. Few landing overrun accidents in rain were reported in India resulting in injuries and damage to aircraft.

A decade's statistics show that overrun accidents involving transport category average over 40 per annum. There are over 10 runway overruns in U.S. alone. One in every 15 overrun accidents results in fatality.

Several safety studies have identified unstabilized approach as a contributing factor for landing runway overruns. Not all unstabilized approaches end up in runway overruns.

The common factor in most wet runway landing overrun accidents are

1. Heavy rain /thunderstorms
2. Crosswind/tailwind conditions
3. Late touchdown
4. High speed over the threshold
5. Max. reverse thrust used
6. Runway condition reported wet (not flooded or contaminated). Actual condition of the runway is not reported to the pilots.

It is important to note that

- Airplane braking coefficient is not tire to ground friction, but instead it is the percentage of the total airplane weight on the wheels which is converted into an effective stopping force.

- Wet runway results in less friction available to stop the airplane in an emergency. Runway friction is reduced by the presence of moisture on the runway surface and is a function of the material and techniques used to construct the runway.

- Certification flights are conducted in controlled "dry" conditions, where the friction coefficient is taken as 4mu and the wet runway criteria are extrapolated with a friction coefficient of 2mu. Certification flights are not done in actual wet conditions.

According to Transport Canada's Transportation Development Center, the risk of a jet aircraft overrunning the end of the runway on landing when the runway is slippery is approximately 13 times greater than when the runway is dry. The risk of overruns on landing for aircraft without reverse thrust are approximately four to seven times greater than for aircraft with reverse thrust.

Addressing the issue of wet runway overruns, Capt. Ranganthan [reference 2] urges the need for the training manuals to emphasize the correct landing techniques into wet runways, taking into account the non availability of correct runway information to the flight deck crew.

To minimize the hazards of overruns, the Federal Aviation Administration (FAA) incorporated the concept of a safety area beyond the runway end into airport design standards. To meet the standards, the Runway Safety Area (RSA) must be capable, under normal (dry) conditions, of supporting the occasional passage of aircraft that overrun the runway without causing structural damage to the aircraft or injury to its occupants. The safety area also provides greater accessibility for emergency equipment after an overrun incident.

Data derived over a twelve-year period shows that nearly 90% of all runway overruns occur at an exit speed of **70 knots** or less and most come to rest between the extended runway edges, within **one thousand feet** of the runway end.

Based on this, the FAA published an order that requires either a one thousand foot Runway End Safety Area (RESA) at each runway end or, in its place, an approved aircraft arrestor system (EMAS) for all (FAR part 139) airports in the United States by 2015. <u>The EMAS is engineered to stop overrunning aircraft at 70 knots or less.</u>

ICAO Annexure 14 states that a Runway End Safety Area of 90 m shall be extended from the end of each runway. Furthermore, <u>ICAO recommends a RESA of at least 240 meters for runways 1800 m and longer.</u>

There are many runways, particularly those constructed prior to the adoption of the FAA safety area standards, where natural obstacles, local development, and/or environmental constraints, make the construction of a standard safety area impracticable. There have been accidents at some of these airports where the ability to stop an overrunning aircraft within the runway safety area would have prevented major damage to aircraft and/or injuries to passengers.

In its report on Southwest Airlines B737 wet runway overrun accident(see Flight Safety August 2007), US National Transportation Safety Board observed that the absence of an engineering materials arresting system, which was needed because of the limited runway safety area beyond the departure end of runway 31C contributing to the severity of the accident .

The investigators of the Garuda flight 200 runway overrun accident of March 2007 at Yongyakarta in Indonesia, in their interim report recommended upgradation RESA at Yongyakarta and other airports to 240m length in line with ICAO Annexure 14.

The Sao Paulo runway overrun accident is another example substantiating the need for adequate RESA/ EMAS at airports with airline operations.

The International Federation of Airline Pilot's Association (IFALPA) urges all airports for airline operations to have RESA or EMAS. This will provide the last line of defense to prevent catastrophe. It will reduce the chances of post overrun fire and aid in the reduction of rescue and fire fighting services response time.

REFERENCES:

1. Wayne Rosenkrans., "overrun rethinking protection strategies", Aviation Safety World, August 2006.

2. A.Ranganathan., "Wet runway overruns: Pilot error? System deficiency? ISASI (International Society of Air Safety Investigators) Forum, January-March 2006.

3.Engineered Materials Arresting System for aircraft overruns, FAA Advisory Circular no. 150/5220-22A, Sept.2005

4. IFALPA press release 08PRL06, April 2006.

ENGINEERED MATERIALS ARRESTING SYSTEM (EMAS)

EMAS is a bed of crushable cellular cement blocks placed at the end of runway. Each block is affixed to the pavement with a hot asphaltic mix, forming an arrestor bed to decelerate an overrunning aircraft in emergency. It is a passive system that reliable and predictably gets crushed under the weight of an aircraft. EMAS does not cause damage to the aircraft.

Standard EMAS installations are based around a design aircraft. This is the critical aircraft or type that uses the runway regularly and puts the highest demands on the EMAS—usually the largest and heaviest airplane expected to use the runway. Design runway exit speed is 70 knots.

At least 600 ft of the safety area (including the EMAS bed) is for undershoots if the approach end has vertical guidance. Setback (the distance between the threshold and the leading edge of the arrestor bed) is 35–75 ft.

Nonstandard EMAS installations are based on design aircraft expected to use the runway. Design runway exit speed is at least 40 knots. Less than 600 ft of safety area (including the EMAS bed) is for undershoots.

Both types of EMAS installation - standard and nonstandard - are designed and tested using no reverse thrust and poor-braking-action (0.25 braking friction coefficient) aircraft deceleration standards.

• The EMAS is typically the full width of the runway and the arrestor bed is set-back from the end of the runway

• On short runway safety areas EMAS typically extends the length of the space available.

• On long runway safety areas the arrestor bed set-back is increased and the system is sized for 70 knot performance.

• The front of the EMAS includes a grade-break that transitions the aircraft into the material.

• Beyond the runway width, the sides of the EMAS are stepped to provide emergency vehicle access and passenger egress.

As on fall 2007, there were twenty-six EMAS installations at twenty airports worldwide, with seven additional installations programmed for completion in 2007. EMAS is also making inroads into Europe and Asia.

To date, there have been four successful commercial aircraft arrestments for the ESCO-EMAS system: a Saab 340 commuter aircraft in May 1999, an MD-11 cargo aircraft in May 2003, a B747 cargo aircraft in January 2005, and a Falcon 900 business jet in July 2006. The first three arrestments occurred at JFK International Airport in New York, and the fourth was recorded at Greenville Downtown Airport in South Carolina. In all cases, the arrestments were successful, with no injuries or significant damage to the aircraft reported.

REFERENCES:

1. Steven Oetzell., ”Getting to know EMAS”, Professional Pilot, Sept.2007.

2.ESCO EMAS—Engineered Material Arresting System—brochure.

EMAS Installation

The tiered sides and back of an EMAS arrestor bed make passenger egress safe and easy.

Loads generated by tires crushing the arrestor bed material-not friction-safely decelerates the aircraft

EMAS in Europe & Asia

In 2007, two EMAS systems were installed in Asia at the Jiuzhai-Huanglong Airport (JZH) in Sichuan Province, China. These are the first to be installed in Asia.

Barajas International Airport in Madrid, Spain will install two EMAS. These will be the first EMAS systems installed in Europe.

LITHIUM BATTERIES AND IN-FLIGHT FIRE RISK

Adopted from IFALPA safety bulletin of May2, 2007

With passengers increasingly bringing on board portable electronic devices powered by batteries , there is an in-flight fire risk. Normally they pose little danger, but when the batteries are damaged, abused, or have a manufacturing or design defect, they have the potential to overheat or cause fire. Once ignited, a battery fire may be difficult to extinguish, reigniting several times before being fully controlled.

Following are the fire incidents involving passenger electronic equipment.

• A fire in a bag in the overhead bin of a 747 aircraft in Chicago in May 2006. The fire was detected during boarding and was determined to have originated in an external lithium ion battery pack in a passenger's bag.

• A lithium ion battery fire in a laptop during passenger boarding of a 777 in Los Angeles in September 2006. The laptop was not in use at the time and was stowed in a compartment in the first class section of the aircraft.

• A lithium metal battery fire aboard a Portland, Oregon bound flight in December 2006. The battery was powering a passenger's personal air filter in flight; the crew successfully extinguished the fire, diverted the aircraft and made an uneventful landing.

• A battery or batteries caught fire

in the overhead bin of a JetBlue flight that had departed from JFK New York in February 2007, generating smoke that entered the passenger cabin. The Flight Attendants successfully suppressed the fire and the Flight Crew made an uneventful diversion.

The above incidents have shown that passenger electronic equipment fires represent a real and significant risk to aviation safety. By following procedures appropriate to a battery fire, this risk can be mitigated and the likelihood of a safe outcome to an incident increased.

The following are characteristics specific to a battery fire:

1. A battery has a higher likelihood of catching fire through thermal runaway during or immediately following a charging cycle, although the effects of thermal runaway may be delayed for some period of time.

2. A battery may catch fire while not in use and stowed in a bag, if exposed contacts are connected by a conductive material (e.g. a coin or set of keys). A device with a battery fire may emit sparks or flames from the battery that are several feet high. Following the incident in Los Angeles, eyewitnesses described flames between 2 and 8 feet above the device.

3. A burning battery may emit flammable gases or molten material.

4. Halon may have no affect on some battery fires, although Halon will suppress a fire of surrounding flammable material, or prevent its ignition. (Halon has been shown to be ineffective against lithium metal battery fires in testing conducted by the FAA Technical Center.). Lithium metal batteries differ from the lithium ion batteries found in laptops and cell phones, are typically non-rechargeable, and power passenger and crew devices such as digital cameras and flashlights.

5. A fire that appears to be extinguished may reignite some time later.

Recommended crew actions for Combating an In-flight Fire due to passenger electronic devices:

If a fire is discovered involving a electronic device, it is recommended that the Flight Crew direct the Cabin Crew to take the following steps, while considering an immediate diversion if the fire is not quickly contained:

- Immediately fight the fire using the closest extinguishing device, while avoiding water extinguishers.
- Maintain communication between the cabin crew and cockpit in order to relate the effectiveness of the fire fighting effort.
- Remove any external power from the device.

Note: If two or more Flight Attendants are available, the above steps should occur simultaneously

- Don Protective Breathing Equipment (PBE) and continue fighting the fire with a Halon extinguisher, if available.
- Move passengers away from the area to protect them from the large mount of smoke likely to be produced.
- Consider moving therapeutic oxygen installations away from affected area.
- Once the fire appears to have been extinguished, consider moving the device to an area without flammable material, such as a galley oven (if not adjacent to the cockpit). The device should not be moved if it is still on fire, or if it is too hot to be moved safely.
- Remove power to remaining passenger outlets until the aircraft's system can be determined to be free from faults, if device was previously plugged in.

RESTRICTION ON BATTERIES IN CHECKED BAGGAGE

Effective Jan1,2008, U.S. Dept. of Transportation (DOT) does not allow **loose lithium batteries** (Lithium ion as in Laptops and Lithium metal batteries as used in small cameras, LED flashlights etc.) in checked baggage. They are allowed in equipment. They are allowed in cabin when protected from damage and short circuit.

WEB WATCH

http://www.ifalpa.org IFALPA site - a must for deck crew for safety bulletins, press releases, briefing leaflets and more..

PHOTO OF THE MONTH

A340-600 crash before delivery

On 15th November 2007, at Airbus production facilities in Toulouse, an Airbus A340-600 due to be delivered to Etihad Airways was involved in an incident.

According to Airbus, the aircraft had completed final engine run ands was exiting the engine run zone when it impacted a containment wall and was severely damaged. Of the nine persons onboard, five were injured.

The Confidential Aviation Hazard Reporting System (CAHRS) provides a means of reporting hazards and risks in the aviation system before there is loss of life, injury or damage. It is open to anyone who wishes to submit a hazard report or safety deficiencies confidentially and non-punitively. Reports help to identify deficiencies and provide safety enhancement in areas of aviation. CAHRS forms can be collected at different location of KAC (i.e. Flight Dispatch) Premises. Completed forms can be dropped in FS&QA allocated box at Flight Dispatch or e-mailed to kwioeku@kuwaitairways.com or faxed to 00965-4749823 or mail to Flight Safety and Quality Assurance office, Operations Department, P.O. Box 394, Safat 13004, Kuwait Airways –Kuwait.