KUWAIT AIRWAYS

FLIGHT SAFETY

AN IN-HOUSE NEWSLETTER OF OPERATIONS DEPT.

Vol.2, No.6 Flight Safety & Quality Assurance Division June 2007

In this issue

Editorial

We hope you enjoyed reading the May issue. In this issue, we look at MK Airlines B747 reduced power take-off and collision with terrain. This is an example where non compliance with SOPs, crew fatigue and other operational issues contributed to the accident.

Continuing on human fatigue, a simple means of calculating sleep debt and the jet lag is given which can be used to effectively manage sleep and reduce fatigue.

As always, we look forward to your feed-back, suggestions and contributions in the form of articles, anecdotes, pictures, etc. which can be sent to our office address given in this page.

Happy reading and many more safe landings.

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

MK airlines B747 reduced power take-off and collision with terrain

Adopted from "Fatal Calculation" by Linda Werfelman in the Oct.2006 issue of Aviation Safety world and Transportation Safety Board of Canada Aviation Investigation Report A04H004

On 14 October 2004, at about 0654 UTC, an MK Airlines Limited Boeing 747-244SF on a non-scheduled international cargo flight from Halifax, Nova Scotia, to Zaragoza, Spain, as MK Airlines Limited Flight 1602(MKA1602) attempted to take off from Runway 24 at the Halifax International Airport. The aircraft overshot the end of the runway, became airborne and then struck an earthen berm.

The aircraft's tail section broke away from the fuselage, and the aircraft remained in the air for a while before it struck terrain and burst into flames. The aircraft was destroyed by impact forces and a severe post-crash fire. All seven members onboard were killed.

This was the third in a series of four flights and was operating with an augmented crew of two captains, one first officer, and two flight engineers. A loadmaster and a ground engineer were also on board.

The series originated on 13 October 2004 at Luxembourg, as MKA1601 destined to Bradley International Airport, Windsor Locks, Connecticut, United States. The aircraft took off at 1556 UTC after a delay of six hours.

After being at Bradley for 4.5 hours for cargo unloading and loading, the aircraft operated as MKA1602 left for Halifax International Airport, Nova Scotia at 0403 UTC Oct.14. It was to continue as MKA1602 to Zaragoza, Spain, and return to Luxembourg.

After landing at Halifax at 0512 UTC, more cargo was loaded into the aircraft. Two crew members not identified were observed sleeping in passenger seats during the loading.

The MKA1602 captain was the pilot communicating with ATC and the first officer was the pilot flying.

At 0653 UTC (0353 local time) the crew began the takeoff roll. During rotation, the aircraft's lower aft fuselage briefly contacted the runway (See the takeoff sequence figure in page 2).

A few seconds later, the aircraft's lower aft fuselage contacted the runway again but with more force. The aircraft remained in contact with the runway and the ground to a point 825 feet beyond the end of the runway, where it became airborne and flew a distance of 325 feet. The lower aft fuselage then struck

Flight Safety/aircraft Accident Links

kacops.kuwaitairways.com
www.ntsb.gov
www.bea-fr.org/anglaise/index.htm
www.bst.gc.ca/en/index.asp
www.bfu-web.de
www.aaib.gov.uk/home/index.cfm
www.atsb.gov.au/

an earthen berm supporting an ILS localizer antenna.

The aircraft's tail separated on impact, and the rest of the aircraft continued in the air for another 1200 feet before it struck terrain and burst into flames. The final impact was approximately 2500 feet past the departure end of Runway 24, at an elevation of 403 feet ASL.

The airport weather at 0700 UTC included wind from 260° at 6 Kts, visibility of 15 miles, overcast ceiling at 1800 ft and temperature of 10°C.

The airplane CVR was damaged beyond use by the post-impact fire. DFDR yielded data that enabled analysis of flight performance during takeoffs at Bradley and Halifax.

The Transport Safety Board (TSB) of Canada investigated the accident and concluded that the crew unknowingly used the previous flight take-off weight (Bradley) to generate the Halifax take-off performance data using the Boeing Laptop Tool (BLT) which resulted in incorrect V speeds and thrust settings being transcribed to the take-off data card. These were too low to enable the aircraft to take off safely for the actual weight of the aircraft.

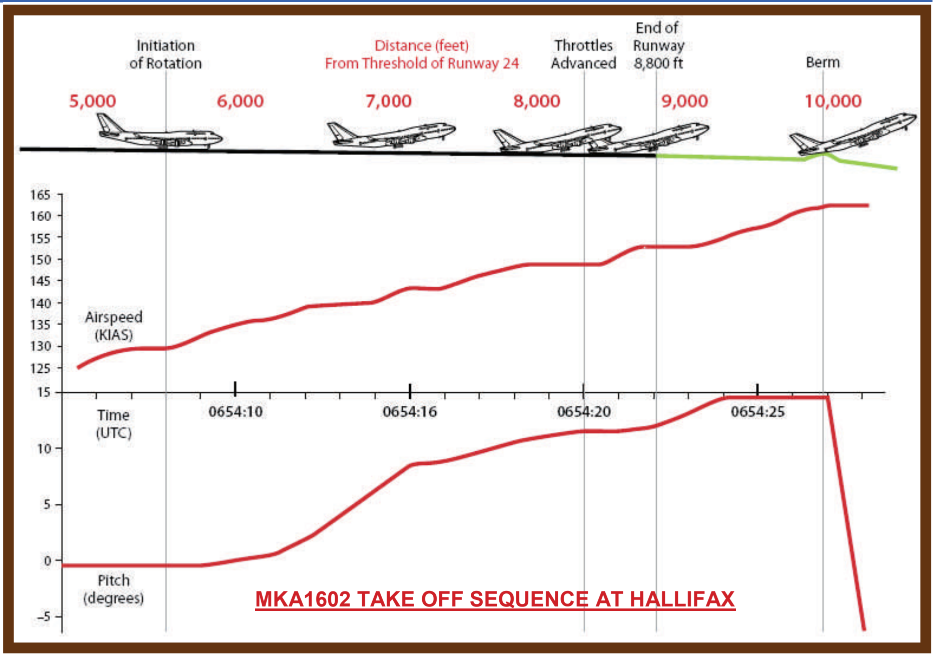
Contributing to this was the crew's non-adherence to the operator's procedures for an independent check of the take-off data card and the gross error check.

Crew fatigue likely increased the probability of error during calculation of the take-off performance data, and degraded the flight crew's ability to detect this error.

Crew fatigue, combined with the dark take-off environment, likely contributed to a loss of situational awareness during the take-off roll. Consequently, the crew did not recognize the inadequate take-off performance until the aircraft was beyond the point where the take-off could be safely conducted or safely abandoned.

Following are the details of these & other aspects that contributed to the accident.

SOP difficulties: In 2000, when MK Airlines changed its 747 SOPs and required all 747 pilots & Flight engineers to undergo additional training, the captain of MKA1602 "had some difficulties adjusting to the new SOPs." There were instances where supervisory pilots had to counsel him regarding non-adherence to SOPs; however, in the period before the accident, he had demonstrated a marked improvement."



The captain was not comfortable using personal computers and software such as BLT and preferred to refer paper charts and manuals in calculating the performance data.

The colleagues found the captain to be competent flying the aircraft and was respected, although he preferred to work in a casual manner.

The First Officer was a competent pilot and comfortable using Personal computers. As the only first officer for the series of flights, he would have had to be an active crewmember on duty on the flight deck for all takeoffs, departures, arrivals and landings for the series of flights.

The Company culture: The MK airlines at the time of the accident was operating six DC-8s and six 747s. Several flight crew members told the investigators that there were crew shortages, specially for 747s.

The report said that the airline had a familial approach to the business which resulted in a strong sense of loyalty and commitment but the managers and supervisors would have had difficulty ensuring that their 'friends' adhered to the company procedures and policies.

The company managers said that they had an "open approach" to flight safety and that they wanted a flight operations quality and flight safety program that was developed in-house to reflect the company culture. The program development was slow and at the time of the accident, some components described in the Company Operations Manual (OM) had not been fully implemented.

Not long before the accident, at the request of the company's managing director, the captain of the flight 1602 had submitted a letter to the company expressing concern about the increasing number of pilots leaving the company, indicating that there were not enough number of crews for the fleet and suggested a new compensation package.

Records showed that the Ghanaian Civil Aviation Authority (GCAA) had decreased the frequency of its inspection to MK airlines and the actual inspections performed in the two years before the accident were below the minimum frequency of about 20 inspections indicated in the inspector's handbook.

Excluded Weights: The maximum allowable weight of the aircraft was 377,842 Kg. The weight -and-balance information left at Halifax by the flight 1602 crew indicated that the takeoff weight was 350,698 Kg, with center of gravity within limits. The actual weight was about 358,800 Kg -higher than recorded because the weight of several items were inadvertently excluded.

Self-study BLT: The report said that Training on new technology and equipment was conducted through "self-study and hands-on experience, using training material developed from the manufacturer's manual." "The information was distributed to the crew through notices but had not been incorporated into the OM. There was no formal documentation to record an assessment of the individual knowledge and competency of using the equipment."

The BLT included a weight-and-balance summary page on which the computer's user could enter passenger weights, cargo zone weights and fuel; using this data, the BLT updated the takeoff weight at the bottom of the summary page. The updated weight was then "passed back to the planned weight field on the main input dialogue screen, and would automatically overwrite any entry in the planned weight field, without any notification to the user." The report said that this feature was "believed to be a key element in how the incorrect takeoff performance data was generated."

In Feb.2004, 747 flight crew members received a 46 page manual on how to use the BLT to calculate performance data, along with a notice from the company's 747 chief training pilot asking crewmembers to study the information "for when the BLT program is put onto onboard computers." Some crew members received instructions for using the BLT during regular recurrent training, but most received no formal training on the BLT, the report said.

In March 2004, 747 flight crew members received a two-page notice—one page for pilots and the other for the loadmasters—that said the BLT software had been installed on all aircraft computers and approved for calculating performance data. The notice asked crew members to use the accompanying procedure to complete takeoff data cards.

On the loadmasters page, the notice said "When closing weight-and-balance page, the takeoff weight as listed in the weight-and-balance page will now appear in the planned takeoff weight block." This was not included in the instruction for pilots.

The Boeing Laptop Tool (BLT)

The notice also asked flight crew members to read the instructions in the BLT manual. The report said that "it could not be ascertained whether the crew of flight 1602 had read the BLT manual issued in February or the simplified one issued in March." Report from other crew members indicated that the operating captain was not comfortable using BLT, while the first officer had been using it.

In the absence of CVR tape, it was difficult to determine why exactly the crew choose low EPR settings and low rotation speeds, the report described the following as the most probable scenario: The takeoff data card was most likely completed using performance data from BLT. The FDR data for the Halifax takeoff was nearly identical to the Bradley takeoff, indicating that the Bradley takeoff weight was used to generate the performance data in Halifax. It was most likely that the Bradley weight was unknowingly transferred to the performance page due to reversion feature of the software. The user subsequently selected "calculate," which resulted in the generation of incorrect V speeds and thrust settings for Halifax. The flight crew used these settings during the attempted takeoff. The thrust settings were too low to enable a safe takeoff.

24-hour Duty Day: A 2002 revision of the OM established a maximum duty time of 24 hours—and 18 flight hours–for an augmented crew flying one to four sectors. The flight 1602 crew at the time of accident had been on duty nearly 19 hours had they completed their flight schedule. Delays at Luxembourg and Bradley would have resulted in a 30 hour day-duty. Voyage reports indicated that the flight's loadmaster and flight engineer had been on duty 45.5 hours.

While the OM said that all flights were planned in accordance with the limitations of the company's approved rest, duty and flight time schemes, a review of planned duty periods for MKA 1601/1602 showed that about 71 percent of the flights were planned for longer than 24 hours. Actual duty period for MKA 1601/1602 exceeded 24 hours 95 percent of the time. Company management was aware of this but not GCAA.

Members of other MK Airlines flight crews said that they began to feel fatigued during stopover at Halifax and tried to nap there. Sleeping in airplane was a routine fatigue-management practice of MKA indicating that the crew were attempting to mitigate risks associated with fatigue.

The MKA1602 flight crew were under fatigue, particularly the first officer who happened to be the critical crew member required for every landing and takeoff.

After the accident numerous safety measures were taken by Mk Airlines, GCAA and Boeing which included:

- GCAA told MK airlines on Nov.1, 2004 to stop using BLT and to comply with rest requirements described in GCARs for all crew members including loadmasters and ground engineers.
- The Boeing Co. on Nov11, 2004 issued a BLT Operators message to all BLT users, reviewing the software feature that automatically overwrites entries in the planned weight field on the main screen when a user views the weight-and-balance summary page, reminding users that performance data are calculated using the weight in the planned weight field, and urging operators to ensure proper training for their crews.

As a result of this investigation, TSB Canada recommended the regulatory authorities to "establishment a requirement for transport category aircraft to be equipped with takeoff monitoring system that would provide flight crews with an accurate & timely indication of inadequate takeoff performance."

HANDLING FATIGUE

Dr.M.S.Rajamurthy

Once again, in the MK Airlines accident we saw the role played by crew fatigue. In the following a simple means of calculating the sleep debt and the jet lag is given, which could be used to handle fatigue.

SLEEP DEBT CALCUALTOR *

Your personal sleep debt can be calculated using the following method which is illustrated with an example.

Step 1: Over the last week, write how many hours of sleep you had per night?

Saturday: ___	hrs	Saturday:	5 hrs
Sunday: ___	hrs	Sunday:	5 hrs
Monday: _____	hrs	Monday:	5 hrs
Tuesday: ___	hrs	Tuesday:	6 hrs
Wed. day: _____	hrs	Wed. day:	5 hrs

Step 2: Total these: _hrs Total: 26 hrs

Step 3: Think about a day when you felt alert and at your top performance. How many hours of sleep did you get the night before? If you are not sure, put 8 hours. Then multiply that number by 5.

__ hrs x 5 =___ 8.5 hrs x 5 = 42.5 hrs

Step 4: Subtract the Step 2 by step 3 i.e. Step 3 hours - Step 2 hours:

26 - 42.5 = **-16.5 hrs**

This is a sleep debt of 16.5 hrs i.e. Two nights of sleep in the red!

Results:

<u>If the number is positive:</u>
Congratulations, your account is in the **black**! Keep getting your sleep.

<u>If the number is negative:</u>
Your sleep account is in the **Red**.
You are carrying a sleep Debt.

JET LAG CALCULATOR *

Jet lag occurs when circadian clock is moved to a new time zone. This affects physical functions of digestion, hormone secretion and most notably sleep. Knowing the time shift at destination using the chart below, most sleepy and most alert time periods with respect to the home can be determined. In the chart fill in your destination time to see when you will be most sleep and most alert and use this information to your advantage. This can be used to get suitable rest at the destination and reduce fatigue. See the example

Home (_________________________)

12	1	2	3	4	5	6	7	8	9	10	11	12p+	1p	2p	3p	4p	5p	6p	7p	8p	9p	10p	11p
			SLEEPY					ALERT							SLEEPY					ALERT			

Destination(_______________________) p stands for p.m.

Example: Home (<u>Kuwait</u>)

12	1	2	3	4	5	6	7	8	9	10	11	12p	1p	2p	3p	4p	5p	6p	7p	8p	9p	10p	11p
			SLEEPY					ALERT							SLEEPY					ALERT			
10	11	12	1	2	3	4	5	6	7	8	9	10	11	12p	1p	2p	3p	4p	5p	6p	7p	8p	9p

Destination(<u>London</u>)

PHOTO OF THE MONTH

Runway incursion?! Who is at fault? What went wrong?

Runway incursion remains a significant risk to the safety of aircraft. Runway incursions have multiple causal factors generally involving flight crew, Air Traffic Controllers (ATC) and airfield operations.

Many times Incursions occur due to the non adherence or misinterpretation of ATC instructions. In a recent incident, a Virgin Atlantic Jumbo missed a SkyWest Brasilia within 50 feet at LA as SkyWest took a wrong turn violating a safety zone.

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.