focus

ON COMMERCIAL AVIATION SAFETY

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UNITED KINGDOM FLIGHT SAFETY COMMITTEE

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FOCUS *is a quarterly subscription journal devoted to the promotion of best practises in aviation safety. It includes articles, either original or reprinted from other sources, related to safety issues throughout all areas of air transport operations. Besides providing information on safety related matters,* ***FOCUS*** *aims to promote debate and improve networking within the industry. It must be emphasised that* ***FOCUS*** *is not intended as a substitute for regulatory information or company publications and procedures.*

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Editorial

Could the root cause of many incidents be the result of poor discipline?

Many of the more common accidents and incidents have a “Human Factors” element to them. This is not surprising as the interaction between man and machine is subject to error as man is not infallible and will make mistakes.

Six areas of current concern in the industry are:

- Level busts
- Runway incursions
- Deviations from Standard Instrument Departures (SID)
- Deviations from Standard Arrivals (STARS)
- Poor use of the radio
- Failure to follow Standard Operating Procedures (SOPs) and check lists

Level busts have as their main cause one or more of the following human errors: failure to hear ATC instructions, failure to read back instructions correctly or failure to set the correct values on instruments and autopilots. 30% of level busts occur after a pilot has correctly read back the cleared level to ATC.

Is this because we have discouraged pilots from making a note of these critical values on the pilot log? Has the introduction of the paperless cockpit brought this about? It seems logical that during the R/T transmission if you write down the critical information then you will have an aid to memory when reading back the information. This will also provide a reference for later. Not having a note will mean that you have to rely on your memory and we know how unreliable that can be.

Runway incursion and deviations from SIDs and STARs are caused in the main by pilots failing to comply with the instructions given to them or becoming confused and having no written notes of their clearance. Lack of familiarity with the airfield and failing to read the airfield chart during planning also contributes to these errors and highlights the need for better pre-flight planning.

The use of the radio and the knowledge of the correct phraseology seems to have deteriorated with time. The inability to hear and read back instructions is the cause of many unnecessary radio transmissions. This can at times overload the system and cause frustration to both pilots and ATC, leading to incidents and losses of separation.

Recent studies show us that one in four first calls by pilots after departure are incomplete. Remember Callsign, SID, Passing level and cleared level (or first stop altitude on a stepped SID).

Why do pilots fail to follow procedures and checklists? Is it because they believe they know better? Time and again we see incidents and accidents caused by the crew failing to follow the correct procedures. In a recent incident where a crew experienced smoke fumes on the flight deck they failed to put on their oxygen masks believing there to be insufficient smoke. Did they use the appropriate checklist? Did they not realise that carbon dioxide can not be seen and can cause incapacitation. Failing to follow procedures and check lists is a known killer.

So what do all of the above errors have in common? They are all symptomatic of one or more of the following: poor self discipline, poor cockpit discipline and poor captaincy. The whole reason for multi crew operations is to ensure that the crew monitor what each other do. That includes listening to the radio, understanding the layout of airfields, correcting any errors made and ensuring the company procedures are followed to the letter and that all checks are followed and the actions correctly taken. Good communication on the flight deck is essential for the safe operation of the aircraft. Crew Resource Management (CRM) training was introduced to improve this aspect of multi crew operations.

The Captain of the aircraft is responsible for the proper operation of the aircraft. He is therefore responsible for ensuring that the radio procedure is correctly executed, clearances are recorded and followed, that pre-flight planning is adequately done, that the checklists and company procedures are followed, that assigned altitudes are not bust. He has a great deal of responsibility and therefore needs to be up to the task.

Good captaincy requires good self discipline, the fostering of good cockpit discipline and thorough monitoring of all that takes place on and off the flight deck, ensuring that when things go wrong everyone knows the reason and how not to let it happen again. It is a position that all first officers should aspire to.

So why is it that there are so many incidents and accidents? Is it because the standard of self discipline had been allowed to decay? Is it because flight deck discipline has deteriorated in spite of the introduction of CRM training? Is it because captaincy skills are not being passed on to the first officers?

If we intend to reduce the number of accidents and incidents we need to find ways of improving the standards of communication, management and discipline on the flight deck.

Chairman's Column

Emergency Evacuations

by Stuart McKie-Smith

It was very encouraging to see that all the passengers and crew of the recent A340 event were able to evacuate the aircraft with only minor injuries.

The introduction of increasingly larger passenger aircraft into service over the last 20 years raises some interesting discussions on passenger and crew evacuation. The internationally accepted (and certainly for JAR operators) evacuation time is 90 seconds from aeroplane to ground. Compliance has to be shown by demonstration and, amongst a variety of criteria that have to be fulfilled (JAR 25 – 803), the test must be carried out in the dark, through half the exits, with 50 % of the passengers being over 50, 40% of them female, and 15% females over 50 years of age (and three infant-size dolls). Add to this the requirement for one-half of the total carry-on baggage, blankets and pillows, to be scattered in the aisles and by the emergency exit access, 90 seconds appears to be a very short period of time. The temptation for manufacturers to use Olympic standard passengers for the test could be overwhelming!

The case for listening carefully to the cabin emergency briefing takes on even greater importance with these larger aircraft.

The regulations state that a safety briefing must be given explaining the emergency equipment. Unfortunately there is nothing to say that passengers actually have to listen to the briefing. It is understandably frustrating for the cabin crew (who are professional aircrew on board the aircraft for the safety of the passengers) to find themselves on many occasions during their demonstrations, talking to themselves. It is only when a passenger disrupts the briefing, either visually or orally, that the cabin crew are in a position to comment. Those of us who are frequent flyers could be the worst offenders. There is a tendency to think that there is nothing new to hear, and, in spite of requests these days from the captains to pay attention, we are perhaps not as attentive as we could be.

New technology for slides, doors and other equipment (and of course adrenalin!) greatly enhances the passenger's chances of survival, but in the end it is going to be the aircrew, and in particular the cabin crew, who contribute most to their survival.

The chances of sitting in the same seat for every flight are remote, so noting the nearest exit is well worth the few seconds that it takes to look. It is also worth checking your route to that exit to see whom you are likely to be standing on to get there!

UK FLIGHT SAFETY COMMITTEE OBJECTIVES

- **To pursue the highest standards of aviation safety.**
- **To constitute a body of experienced aviation flight safety personnel available for consultation.**
- **To facilitate the free exchange of aviation safety data.**
- **To maintain an appropriate liaison with other bodies concerned with aviation safety.**
- **To provide assistance to operators establishing and maintaining a flight safety organisation.**

Electromagnetic Interference from Wireless Internet Equipped Laptops

A recent report received by the CAA, of possible in-flight electromagnetic interference with an aircraft's navigational systems by portable electronic devices (PED), prompted the Director to write to all CAR, Part 119 Air Transport operators. To reach the wider aviation community, we have decided to publish the report in Vector.

From the Report

While in the cruise, "NOT ON INTERCEPT HEADING" was displayed on the Flight Management Computer (FMC). The Inertial Reference System positions were checked and found to be normal, but the FMC showed a track deviation 7NM right of track. The autopilot had made no heading adjustment to respond to this and the flight director was commanding the existing heading. The nav display showed the magenta track [the track the aircraft should be on] to be to the right. Heading mode was selected to regain track, but LNAV (Lateral Navigation) would not capture. The Inflight Service Director was called and asked to check the passengers for electronic devices that could be interfering with the aircraft's systems. Two laptop computers with wireless LAN (Local Area Network) capability were found to be operating in the cabin. The captain required all electronic equipment in the cabin to be turned off, and the navigation discrepancy disappeared over the next 25-minutes period. All indications and systems were in agreement by the next waypoint.

CAA Comment

Although the cause was not confirmed, this event is likely to have been caused by PED interference.

Many laptop computers are now equipped with built-in wireless Internet technology. Depending on the setup of the computer's operating system, this type of device could attempt to connect, and therefore transmit electromagnetic energy, as soon as the laptop is powered up. This has the potential to significantly interfere with aircraft systems in a manner similar to an active cellphone.

Civil Aviation Rule 91.7 *Portable electronic devices*, prescribes that "no person may operate, or pilot-in-command allow the operation of any cellphone or portable electronic device that is designed to transmit electromagnetic energy, on any aircraft that is operating under IFR".

To prevent electromagnetic interference with aircraft systems, in accordance with rule 91.7, operators should actively prohibit the use of wireless Internet equipped laptop computers while the aircraft is being operated under Instrument Flight Rules (IFR).

With acknowedgement to Vector/CAA News

'Send Three and Fourpence'

by Paul Jones, Head of Operational Safety Performance, NATS

Introduction

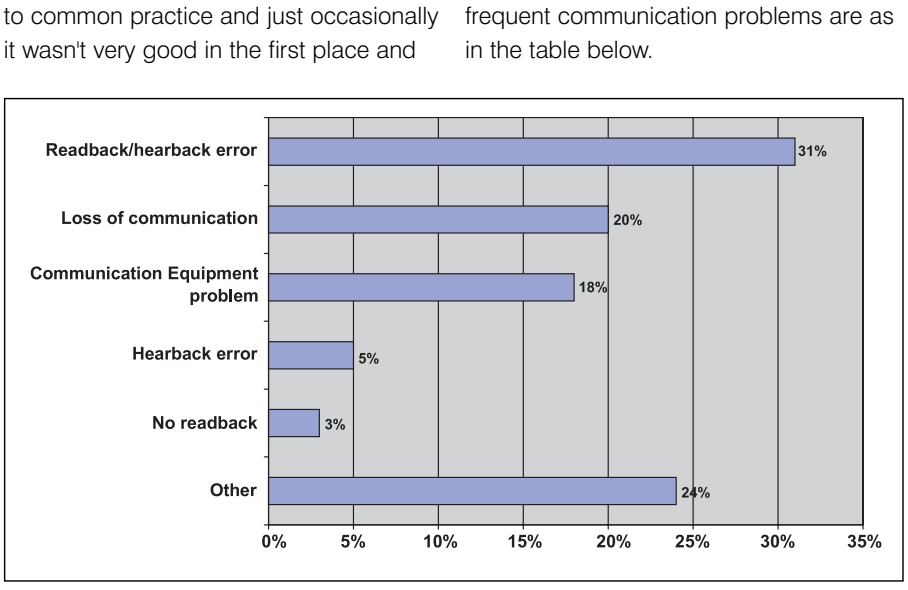
Seventy million years ago as he climbed out of the primeval bog man first uttered his first incoherent sounds, communication was invented and from that moment on he's never stopped. Granted the means have become a little more sophisticated but the messages more complicated and the opportunity for misunderstanding has never got less. Wars have started when the wrong words were used at the wrong time and peace has broken out when the right words were used at the right time. Life long relationships start with a few simple words and have foundered on the rocks of misunderstandings over who said what to whom and when, (not that any male would ever be able to remember anyway.) But the point is made, good communication is an essential tool and bad communication is a disaster waiting to happen

Have you ever listened to communications using R/T? Most controllers shy away from the experience of listening to themselves when they can and pilots rarely get the opportunity. It's not exactly like the films ~ there is no script to work from ~ it's 'off the wall' in common parlance and sometimes it makes fools of us all. Rarely does sampling of RT not show up some mistake either in phraseology or understanding and although there are the occasional witticisms that make the back page of august magazines for the most part humour, sarcasm or badinage doesn't have the same appeal in the cold light of day.

Attempting to achieve best practice before 'best practice' was invented our forbearers came up with standard phraseology and then wrote it in a manual and informed the world about daysimals and tousands ~ remember reading it? Most of us did once upon a time but over the years best practice can become lost to common practice and just occasionally it wasn't very good in the first place and had to be revised. Did you notice? When was the last time you actually thought about what you said or more importantly what you should have said on the RT? Are you up to date?

The Type and Scale of the Problem

National Air Traffic Services consider communication error to be a key area of risk. In many incidents communication error is found to be a causal, aggravating or situational factor. So what do we mean by communication error? A recent Eurocontrol study shows us that the most frequent communication problems are as in the table below.



Distribution of generic communication problems

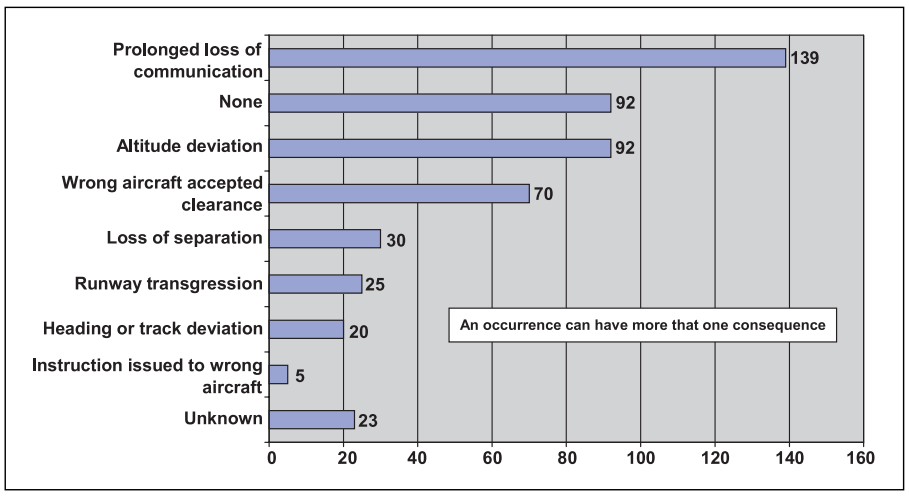
The results from the study are very similar to those found by NATS in the UK. NATS data shows us that during 2004 and 2005 (end February) there were 538 incidents where communication factors were recorded, and there were a total of 662 communication event factors in the 538 incidents.

Having looked briefly at the causal factors it is worth looking at the outcomes, or what actually happened during the events where communication factors were recorded (see table to the right).

It is important to note that the NATS causal factor list is not identical to the Eurocontrol list. The graphs show Eurocontrol data and the descriptions below are taken from the NATS system.

Incorrect pilot readback from the correct aircraft - The pilot's readback of the controller's instruction was erroneous (e.g. wrong level, wrong heading).

Mis-hear - An operational staff member misheard auditory information (e.g. failed to detect an incorrect readback).



Distribution of generic communication problems

An A320 cleared to climb to FL320, made an incorrect readback, which was not corrected by ATC. The A320 was noticed passing FL325 and instructed to stop climb at FL340. Standard separation maintained.

Pilot readback by incorrect aircraft - A pilot readback an instruction that had been issued to another aircraft.

Callsign7301 had departed Airport 1 and was climbed in stages to FL90 under outbound traffic from Airport 2. Callsign7301 was cleared to FL110, and Callsign7031, just airborne from Airport 1 took this call and started to climb.

The controller clarified which aircraft had taken the climb instruction and stopped Callsign7031 at FL70. The climb instruction to FL110 was confirmed for Callsign7301. There was no loss of separation, and no further problems were encountered.

Conclusion

As the skies get even busier, correct, standard well delivered RTF is vital. Communication error plays a significant role in runway incursions and level busts. We have to work together as a community to eradicate these errors in the first place and design systems that will 'trap' those that get through in the future.

How many of us know what the mandatory read back list is? How many of us think that some UK frequencies get too busy and yet still call for direct routings, high speed or omit required pieces of information that need to be challenged. How many of us allow the traffic to build and don't split the sector or split it too late? When it gets busy - speeding up delivery doesn't help.

The following table details a few tips and hints that if we were all to follow would go a long way to improving the current situation.

What can we all do to help?

Top communication tips for Controllers

Delivery

- If it gets busy do not speed up delivery (it does not help).
- Keep it standard.
- If it's urgent - make it sound urgent (intonation)

Content

- Avoid multiple instructions; ideally don't include more than 2 instructions per transmission
- Avoid giving headings and levels in the same transmission - if possible.
- Keep frequency changes separate from other instructions.
- If you issue a heading ending in '0' add the word degrees. (Except SRAs).

Caution

- Listen carefully to readbacks
- Use the full callsign for Commercial Air Transport.
- Callsign confusion - someone else might take the call

Top communication tips for Pilots

Standard Calls

- On departure pass - callsign, SID, passing level and first step altitude or SID altitude if no step exists.
- On frequency change pass - callsign, cleared level
- Keep it standard and listen out.

Discipline

- Use full callsign and listen carefully for your callsign.
- If in doubt ask.
- If you don't hear anything for two or three minutes - check in there may be a problem.
- Read back ATC instructions in full.

Non Standard Calls

- In the UK Fuel and Medical Emergencies are NOT terms that are acknowledged as specific for initiating action. If it's URGENT always inform ATC by the use of the prefix PAN or MAYDAY.
- Avoid unnecessary calls such as requests for high speed or direct routings.

If in doubt check!

‘STOP IMMEDIATELY’ ATC Cancellation of Take-Off Clearance

At a recent meeting of the UKFSC, areas of concern regarding both the implementation and phraseology used by ATC when cancelling a previously transmitted take-off clearance were identified. Concern was expressed by certain Flight Safety Officers that there have, in the past, been a number of occasions when ATC has cancelled the take-off clearance for an aircraft after it has commenced its take-off roll, for what might be considered to be reasons which were in themselves a greater risk to aircraft safety than was considered desirable. Similar concerns had also been previously raised in CHIRP reports.

The reasons for “STOP” instructions being given have ranged from very valid (serious risk of collision on the ground or in the air) to what might be considered administrative matters e.g. take-off clearance given too early for CTOT/slot time or even a simple change of runway. The latter examples are undesirable situations, as to justify such a course of action may require an equal or, greater risk in continuing the take off than that created by rejecting it.

As a result of the concerns expressed, representations to the CAA (SRG) led to the UKFSC organising a task group of interested parties comprising representatives from the UKFSC Flight Operations and ATC Standing Committees with additional members representing BALPA, GATCO, NATS, CHIRP and CAA (SRG), to evolve guidance for ATCOs and pilots as to the circumstances when an ATC “STOP” clearance may be given to a pilot after the take-off roll has commenced.

The intention was to both reduce risk and improve the common understanding of the issues involved.

The objective was to ensure that safety was maintained whilst avoiding unnecessary “STOP” calls and not denying the aircraft flight crew any pertinent information they could use to ensure the safety of the aircraft and occupants.

The result is that there is now a clear intent that a “STOP” instruction should only be given in a case of a serious collision risk existing. It should not be given for a possible technical malfunction, e.g. engine fire, smoking undercarriage etc; in such a case ATC will inform the flight crew of the visible situation and leave any final decision to the flight crew.

Although a “STOP” instruction from ATC is mandatory, the aircraft commander retains the ultimate responsibility for the safety of the aircraft and so has the authority to disregard the instruction, if he/she should judge that to comply would expose the aircraft to a greater risk. However, he/she can subsequently be expected to justify his/her action of disregarding an ATC instruction.

The information to ATCOs gives guidance as to when the take-off becomes more critical, such as the fact that at a typical 80kts or less most “STOPS” are inconvenient but do not normally pose a significant risk, whereas as speed rises,

the risk associated with a rejected take off rises as well. The information material also provides ATCOs with information on the take-off phase from the flight crew viewpoint, where SOPs are designed to balance the seriousness of the emergency condition with the risk associated with a high speed rejected take off. The information emphasises the vital importance of only issuing a "STOP" instruction when no other alternative appears to be available.

When operating in low visibility or at airfields with restricted views, pilots should be aware that ATC may well be able to see situations developing either visually or through the use of Runway Incursion monitoring systems of which pilots cannot be aware from their current location. In the event of an ATC "STOP" instruction being called they should consider their response accordingly.

A summary of the conclusions of the task group is as follows:

Flight Crew

1. During your take-off roll, you will get information on such items as a visible technical malfunction or situation but not a "STOP" command from ATC. The decision to stop remains yours. This information will be given when the controller believes it to be of such importance that you should immediately be made aware of it.

2. You will get a "STOP" instruction where a serious risk of collision exists. If you decide to disregard the instruction, because you judge that to comply will expose the aircraft to a greater risk, you can subsequently expect to be required to justify your action of disregarding an ATC instruction. ATC will only issue such an instruction when no other alternative means of collision risk avoidance appears possible.

Air Traffic Controllers

1. If take-off clearance has to be cancelled before the take-off run has commenced, the pilot shall be instructed to hold position and to acknowledge the instruction. In the UK, the phraseology to be used is detailed in CAP493 (Manual of Air traffic Services, Part 1).

2. In certain circumstances the tower controller may consider that it is necessary to cancel take-off clearance after the aircraft has commenced the take-off run. In this event the pilot shall be instructed to stop immediately and to acknowledge the instruction.

3. The cancellation of a take-off clearance after an aircraft has commenced its take-off roll should only occur when the aircraft will be in serious and imminent danger should it continue. Controllers should be aware of the potential for an aircraft to

overrun the end of the runway if the take-off is abandoned at a late stage; this is particularly so with large aircraft or those operating close to their performance limit, such as at maximum take-off weight, in high ambient temperatures or when the runway braking action may be adversely affected. Because of this risk, even if a take-off clearance is cancelled, the commander of the aircraft may consider it safer to continue the take-off than to attempt to stop the aircraft.

4. As the aircraft accelerates, the risks associated with abandoning the take-off increase significantly. For modern jet aircraft, at speeds above 80kts flight deck procedures balance the seriousness of a failure with the increased risk associated with rejecting the take-off. For example, many system warnings and cautions on the flight deck may be inhibited during the take-off roll, and between 80kts and V1 most aircraft operators define a limited number of emergency conditions in which the take-off will be rejected. Consequently, at speeds above approximately 80kts, the take-off clearance should normally only be cancelled if there is a serious risk of collision should the aircraft continue its take-off, or if substantial debris is observed or reported on the runway in a location likely to result in damage to the aircraft. The critical speed will be dependent on the aircraft type and configuration, environmental conditions and a range of other factors but, as a general rule, for modern jet aircraft, it will be in the region of 80kts airspeed. The typical distance at which a jet aircraft reaches 80kts is approximately 300m from the point at which the take-off roll is commenced.

5. Controllers should also be aware of the possibility that an aircraft that abandons its take-off may suffer overheated brakes or another abnormal situation and should be prepared to declare the appropriate category of emergency or to provide other suitable assistance.

6. The phraseology to be used in association with these procedures is reproduced below.

Aircraft has not commenced take-off (A/c identity) hold position, Cancel take-off – I say again cancel takeoff –acknowledge.

Aircraft has commenced take-off (A/c identity) stop immediately – I say again (a/c identity) stop immediately – acknowledge.

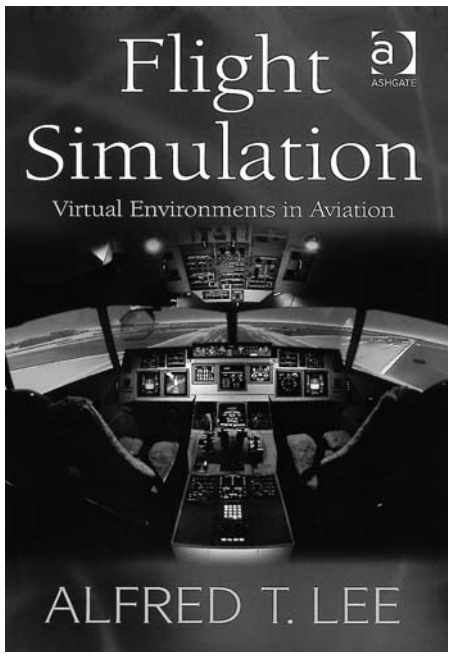
This guidance information developed by the UKFSC task group will be published in greater detail by the CAA (SRG) as both an AIC and ATSIN.

Book Review

Flight Simulation

Virtual Environments in Aviation

by Alfred T.Lee



(0 7546 4287 9) published by Ashgate. Hardback £45.00

Advances in computer, visual display, motion and force cueing and other technologies in the past two decades have had a dramatic effect on the design and use of simulation technology in aviation and other fields. The effective use of technology in training, safety investigation, engineering and scientific research requires an understanding of its capabilities and limitations. As the technology has as its primary goal the creation of virtual environments for human users, knowledge of human sensory, perceptual, and cognitive functioning is also needed.

This book provides a review and analysis of the relevant engineering and science supporting the design and use of advanced flight simulation technologies. It includes chapters reviewing key simulation areas such as visual scene, motion, and sound simulation and a chapter analysing the role of recreating the pilot's task environment in the overall effectiveness of simulators. The design and use of flight simulation are addressed in chapters on the effectiveness of flight simulators in training and on the role of physical and psychological fidelity in simulator design. The problems inherent in the ground-based simulation of flight are also reviewed as are promising developments in flight simulation technology and the important role flight simulators play in advanced aviation research.

The readership includes: flight simulation engineers and designers, human factors researchers and practitioners, aviation safety investigators, flight training management and instructors, training and instructional technologists virtual environment design community, and regulatory authorities.

About the Author

Alfred T Lee is President and Principal Scientist with Beta Research Inc., responsible for initiating, planning and conducting human factors research projects supporting the design and evaluation of aerospace, medical and computer technologies for corporate and government organisations. Formerly he was senior research psychologist at NASA-Ames Research Center, responsible for initiating, planning and conducting human factors research programs in aviation and aerospace. Dr Lee has conducted research in flight simulator design for more than 25 years and is a licensed pilot.

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Hazards to Aircraft from Foreign Objects

by SRG Research & Strategic Analysis Section

The aviation world is now aware that the tragic Concorde accident in France was caused by a strip of metal on the runway that had fallen from a preceding aircraft. The sequence of events, started with a tyre burst and ended in the catastrophic loss of the aircraft. In the aftermath of that disaster there was much concern across the industry about how to prevent such an event happening again. The number of aircraft movements in today's busy airports, and the relatively low number of significant incidents attributable to Foreign Objects show that although Foreign Objects was a major contributor to the Concorde disaster, more modern and conventional aircraft have a relatively good record. This can be attributed to past operational experience resulting in design requirements that consider the specific risk of impact from defined objects including birds. However, the extent of the Foreign Objects, the distribution, size, shape and corresponding potential threat to aircraft is difficult to quantify.

The UK Civil Aviation Authority (CAA), together with the Joint Aviation Authorities (JAA) started to review the many interactive issues. As part of this action the UK CAA embarked on an investigation into the threat of runway debris.

Collected FOD: An array of all sorts of aircraft and GSE components, tools and personal items

The debris found airside is commonly called Foreign Objects Damage, (FOD). This is basically debris of any form on the runway, taxiway or stand area that an aircraft may encounter during normal operations. Note: The study did not include aircraft tyre debris.

To support this initiative, a programme was launched to collect, study and catalogue FOD from a major UK airport. This information is to be used in the investigation of the threats to current aircraft as an aid to future aircraft certification requirements development.

FOD was collected from runway, taxiway and stand areas for a period of ten months to provide a representative range of sizes, weights and material that an aircraft may encounter at different parts of the airport. The FOD gathered was segregated into 'Runway FOD', 'Taxiway FOD' and 'Stand FOD'. The material was weighed, photographed and compiled into a FOD reference catalogue.

A wheel chock, weight 5kg. Found on the runway centreline.

From this study, the FOD gathered from the runway demonstrated that aircraft are the major source of runway FOD.

Pieces of aircraft found were typically, thrust reverser metal honeycomb structure, small metal panels and broken wheel studs. The items collected were mainly lightweight but capable of causing a tyre burst in certain circumstances.

Maintenance equipment found on the runway consisted of spanners, pliers, torches, radios and a wheel chock.

The most likely explanation for the equipment and tools found, is that they were inadvertently left in part of the aircraft, possibly in the wheel well or wing trailing edge areas after maintenance etc. During the take off run and at takeoff rotation the vibration and angle of the aircraft may cause any unsecured items to fall out. The result of such debris being deposited on the runway is difficult to predict depending as it does on many differing factors. Debris of a hard, sharp nature will present a greater hazard to an aircraft than soft rounded objects. The higher the speed of impact and the greater the weight of the object the more likely it is there will be a hazardous effect.

Jagged steel object found on the Taxiway Weight: 0.65KG

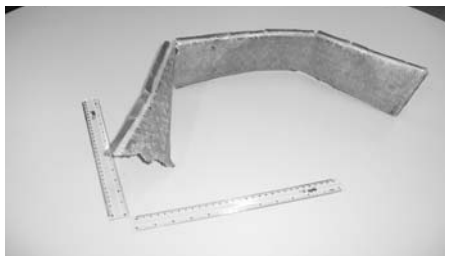
The solid rubber wheel chock was possibly the item of most concern. The chock weighed 5kg; the effects of an impact at take off or landing speeds with this object may be of sufficient magnitude to cause considerable damage to smaller aircraft. This find is not an isolated occurrence, there have been other reports of chocks being found on runways and there has been at least one report of a wheel chock falling from an aircraft in flight.

FOD gathered from taxiways was found to be mainly from Ground Support vehicles and Equipment (GSE). This consisted typically of wheels, brackets, handles, tow bars etc. Broken GSE items, of obviously non Original Equipment Manufacture (OEM) showed poor quality fabrication and fitting indicative of poorly executed on site repairs and modifications. The shape of some other items, such as broken jack pads from aircraft steps, was aligned so that they naturally fall into a stable position presenting a sharp edge uppermost. Other items were nuts and bolts, cargo roller balls and various small metallic items.

Sharp steel items that cause punctures, under inflation and subsequent tyre failures present a considerable hazard to aircraft.

Honeycomb aircraft part found on the runway

The FOD found on the stand, again, was mainly from GSE, with additional items such as passenger baggage suitcase wheels and handles. However, very large items such as a lift truck wheel found on the edge of the stand may damage a tyre or induce a sudden stop to any taxying aircraft.



B747 cowling part. Found on the grass near the runway

What can be done to counter the FOD threat?

In terms of aircraft design, the UK CAA recently conducted a study on the effects of FOD with respect to the Certification Specification requirements contained in CS 25, Large Aeroplanes. It was concluded that, at present, for conventional aircraft, the CS requirements are adequate and sufficient and from a design perspective, all adequate precautions have been taken so that FOD impact will not present a significant hazard. The UK CAA FOD collection study will be considered by EASA when deliberating on the adequacy of the current design requirements for future aircraft applications.

Hazards from FOD, although not specifically mentioned in the CS requirements, tend to be limited by these requirements. However, the existence of FOD especially on high speed sections of runway will always be a potential hazard to aircraft and every effort must be taken to minimise the threat.

Maintenance personnel have a significant role to play in minimising the quantity of FOD. Training and procedures to raise awareness can reduce the instances where items, which appear to have been left in or on the aircraft, fall onto the runway. Having effective GSE maintenance procedures in place and a frequent FOD inspection regime will contribute to FOD reduction. Non OEM repairs and modifications should also be discouraged as significant items of FOD were found to be badly fabricated non standard attachments that have failed in use and departed the vehicle. Action is required to inspect and rectify any GSE with poor quality non original equipment and poorly secured items.

Airports carry out regular inspections for FOD. It forms an important and integral part of aerodrome safety management systems. Inspections are vital and preventive strategies by the airport users that take into account human factors especially in the busy ramp environment must be implemented. Distractions and errors are likely when the pressure to get aircraft away on time is so high. It is important that people follow procedures whatever the environment or the temptation to cut corners. Good housekeeping and FOD awareness programmes will prompt ground staff to spot potential items before they become a hazard and to take action to remove any evident FOD. All organisations that employ staff working in the ramp operational areas should include FOD awareness in their periodic continuation training programmes.

FOD is a threat. It's presence is not only a safety issue but also one of considerable economic impact to operators with tyres, under wing areas, engines etc. being damaged. In practice a 100% FOD free airport is both impractical and unrealistic. However the continuing quest for FOD reduction should be the aim. Effective measures across all areas, from training, procedures, runway inspections to aircraft maintenance and design, the FOD threat can be minimised to an acceptable level.

The UK CAA recently issued NOTAL 2/2005 making recommendations applicable to aerodrome and aircraft operators, maintenance and ground handling operations.

Plane Crazy?

by Mel Lewis

Sitting in a VERY small twin engine aeroplane where one side of it is against your shoulder and the door an arm's length away is not everyone's idea of a fun afternoon. I say "the door" but in fact there is no door which means you are able to look at the ground 2000 feet below with nothing in between.

"Don't worry about that" shouts the helmeted madman next to me with two cameras around his neck, "the G-force will keep you in the plane – although I did fall out of a helicopter once!" It's ok for him, I have a little seat belt between me and oblivion; he is bolted to the bulkhead on a body harness.

The "helmeted madman" is Ian Hay: partner in Flight Images, direct of Get Mapping and co-author of two aerial photography books. Ian kindly invited me on a little trip that took us over a fair proportion of the south of the country to take photographs for clients and also for storage in a massive photo library that forms the basis of an e-commerce website, LondonAerial.com, also operated by Flight Images. (www.londonaerial.com)

Despite being jovial, the air (and there's a lot of it – remember there's no door!) is one of complete professionalism. The pilot and co-pilot work regularly with Ian Hay on photography projects and know how to manoeuvre the aircraft into the best position. At every stage the local air traffic control is informed of our whereabouts and that of our rather worryingly named "Target".

Just as I am considering the nature of our Target, the co-pilot comes over the headphones in a crackly voice – "Two minutes to target". The target in this case is the Cheltenham Gold Cup. In a flurry of activity, Ian gets himself ready and equipped with the chosen camera. Mistakes are expensive in this industry.

Ian ensures that he is firmly fixed to the bulkhead of the plane and then instructs the pilot to bank sharply to the left. Now begins the white knuckle ride – the ground is now below me and looks rather close. "Steady, tighter turn please, steady – level up NOW" the pilot lurches the plane into a level position while Ian snaps away. To describe the feeling a "tighter turn" means that the pilot banks even more and throttles up making any normal person's stomach go into an unrecoverable dive.

We circle the Cheltenham Gold Cup in this fashion for five minutes or so before moving onto the next "target" giving us 20 minutes of peace looking out of the window (the doorway is too scary) and discussing the finer points of photography with Ian. This is a man with a passion for flying and also for photography and as he has combined these passions into a successful business, I begin to realise that perhaps he is not such a madman after all!

In all, about 10 projects were completed in the space of 3 hours then it's back to the airfield at Fairoaks in Chobham. The work doesn't stop there. Ahead are hours of work to make sure that the images are good enough for the clients. Then copying, packaging and sending.

Flight Images are set to grow to great heights both in terms of flying and photographic excellence. I certainly look forward to another trip. Door, who needs a door!

Corporate Manslaughter: Reform at Last?

by Sue Barham, Barlow Lyde & Gilbert

Draft legislation in the UK which aims to make it easier for companies to be convicted of corporate manslaughter may be in force within two years.

Revision of the offence of corporate manslaughter has been debated for more than 15 years since the unsuccessful prosecutions following the *Herald of Free Enterprise* ferry disaster in 1987. The issue last raised its head with the UK Government's White Paper in 2000 which proposed a new offence of corporate killing but the process to reform has moved slowly since then. However the Government has issued a fresh consultation paper together with a new draft bill which it intends to introduce in the current parliamentary session. It may be therefore that the next 18 months will see a new corporate manslaughter offence.

The difficulties with the current law of corporate manslaughter are essentially that a successful prosecution depends upon being able to identify an individual within a company who can be said to be its "guiding mind" and who is himself individually guilty of manslaughter. In practice this has meant that convictions of large corporations – which do not act through, nor whose management is controlled by, one individual – have been extremely difficult to secure. The few successful prosecutions have tended to be of small companies whose management is readily associated with one or more directors who have themselves been judged to be individually culpable, whilst general corporate failures in safety management not necessarily attributable to specific persons have tended to escape this ultimate criminal sanction. Whether such a sanction is in fact necessary given that companies can in any event be more readily convicted under parallel health and safety legislation and sentenced to unlimited fines is another debate. However, if there is to be a corporate manslaughter offence, it is in industry's best interests that it is properly defined and thought out.

The new proposed offence

Many of the difficulties with the 2000 proposal, in which the proposed offence was vaguely drafted with little or no guidance as to what conduct was to be considered culpable and which moreover provided for individual directors to be convicted and ultimately banned for life from holding office, have fallen away in the current draft bill.

Under the current draft bill, only companies can be guilty of corporate manslaughter and the elements of the offence are, in general, more clearly defined. A company will be guilty:

"…if the way in which any of the organisation's activities are managed or organised by its senior managers –

(a) causes a person's death, and

(b) amounts to a gross breach of a relevant duty of care owed by the organisation to the de-ceased
[emphasis added]"

A breach of a duty of care will be "gross" if the failure in management constitutes "conduct falling far below what can reasonably be expected of the organisation in the circumstances". One objection to the previous 2000 proposals that there was no guidance as to how culpability was to be assessed is addressed in the new draft bill which sets out factors to which the jury must have regard. The jury must consider whether the evidence shows that the company breached health and safety legislation and, if so:

(a) how serious was the breach,

(b) whether the company's senior managers knew or should have known about it,

(c) whether senior managers knew or should have known that the failure to comply with health and safety legislation posed a risk of death or serious harm, or

(d) whether senior managers sought to cause the company to profit from the failure to comply.

The good work in giving some clear definition to the ambit of the conduct which will be considered culpable is then however undone to some degree by a provision in the draft bill which gives the jury freedom to have regard to any other matters they consider relevant in deciding whether there has been a gross breach by the company of a duty of care. Although juries will no doubt receive suitable directions from trial judges, this provision seems potentially to give the jury rather more discretion in what matters it takes into account than might be considered appropriate – particularly when one considers the highly charged atmosphere in which corporate manslaughter trials tend to take place.

Jurisdiction and scope

It is proposed that the new corporate manslaughter offence will apply to all companies, both UK and foreign. The trigger for jurisdiction is proposed to be if the harm which results in death is sustained within England and Wales or elsewhere where the English courts have jurisdiction, including on a British-registered aircraft. This leads to two oddities in particular.

First, it means that an overseas company can be prosecuted in the UK for a management failure overseas if that management failure leads to the death of a person in the UK; that is likely to lead to significant difficulties in the collection of evidence given the need for the UK prosecuting authorities to investigate management failures abroad in order to make out a case in the UK. Secondly, in the aviation industry in particular, this could potentially lead to arbitrary results in that there could be cases where the English court has jurisdiction when the only connection with this country is the occurrence of an accident on board a UK-registered aircraft. To take an example, suppose a UK-registered Boeing aircraft crashes resulting in passenger fatalities. The English court would have jurisdiction to prosecute Boeing for corporate killing in respect of the passenger fatalities, wherever in the world the accident occurred. The English court would not however have any such jurisdiction in respect of ground fatalities as those deaths would not have occurred on a UK-registered aircraft.

The aim of the proposed legislation is to make it easier for companies to be successfully prosecuted for corporate manslaughter. Opinions differ as to whether the draft bill will achieve that aim. Progress of this legislation will come under close scrutiny over the coming months and companies will wish to ensure that their senior managers and those responsible for safety within their organisations are fully conversant with the law as it develops in this area.

NetJets – A Unique Safety Challenge

by Captain Mike Jenvey and Captain Catherine Thompson

NetJets Falcon 2000

"Are you ready to copy your brief for tomorrow?" asked the Flight Dispatcher. "You have a show time of 0700z for a 0830z departure from Florence to London City with 5 passengers. At 1145z, you have a ferry flight to London Luton, for a 1330z departure to Samedan/St Moritz with 3 passengers. At 1630z you depart from Samedan to Nice, with a night stop in Nice. Your hotel for tonight is……" What airline operates a route structure like this? Welcome to NetJets!

History

NetJets traces its roots back to 1964, when Executive Jets became the first private jet transportation company in the world, initially offering charter and aircraft management services. The company pioneered the concept of fractional ownership in the USA in 1986 with the NetJets programme which was subsequently launched in Europe in 1996 and in the Middle East in 1998. With fractional ownership our Owners gain all the convenience, guaranteed availability, and freedom of owning their own aircraft but at a fraction of the cost.

NetJets' European operation was established with three Citation II aircraft. Now we operate over 70 aircraft and are growing steadily. Our fleet of aircraft ranges from Cessna Citation Bravos and Hawker 800 XP's right up to the Gulfstream G550. So, short hops from Geneva to London, or a direct flight from Tokyo to Paris, are equally viable. We operate under our own AOC, are based in Lisbon, and meet JAR-OPS 1 requirements. Our 400+ pilots are based all over Europe and are from a broad spectrum of nationalities and aviation backgrounds.

Flight Reservations

How do we ensure the safety of every flight?

Every reservation that is made with NetJets Europe initiates a sequence of events specifically designed to ensure the maximum safety of each flight. With a minimum response time of ten hours between a reservation coming in and a flight departure it is important that a smoothly oiled process is in place to check each reservation. Most of the pre-flight planning is centrally organised at our NetJets Europe Operations Centre in Lisbon leaving the pilots free to concentrate on the safe operation of the aircraft.

Each booking that comes in has a "Quality and Safety Review" completed within ninety minutes of the initial telephone call. This review checks all aspects of the booking such as airport opening hours, runway performance, slot requirements, customs availability, etc. By the time the Quality and Safety Review is completed an exhaustive range of questions will have been asked twice and answered twice, by our International Planning Team.

Equally as important, we confirm that no airspace or airport restrictions exist, or will affect the flight and obtain any advance

Samedan Airport - Europe's highest altitude airport

permission needed to use that airport or over-fly airspace en route to the destination.

These essential formalities are finalised by the NetJets Europe Operations Centre, in addition to all the other necessary flight planning before each and every flight.

We currently have access to 1,000 airports in Europe and over 5,000 airports worldwide. In 2004 we operated to 510 different airports in Europe; these ranged from small VFR airports in the Swiss Alps, to military airports in Greenland to all of the large international airports. If we receive a request for an airport that we have previously not operated to we carry out an extensive "Airport Acceptance and Familiarisation" checklist to collect as much information as possible, to determine the category of airport and to highlight any safety concerns. If it is a Cat B airport Flight Operations and the Safety Department put together a comprehensive briefing for the flight crew to cover all aspects of operation at the airport, and if it is Cat C then our Training Department gets involved. As we have pilots based all over Europe, we often ask pilots to visit the new airfield to collect any local knowledge that could help us to operate safely.

Although the minimum response time is ten hours, normally flights are arranged in advance. Within three days of the scheduled departure our Firewall Department starts monitoring all bookings looking for any potential problems. Especially with VFR only airports we have to be pro-active and start to plan alternatives if it looks like the weather conditions will not be suitable. The forecast winds are checked to make sure that our aircraft will be able to carry out the planned flights with the suitable JAR OPS 1 fuel reserves, and if necessary an upgrade to a different fleet or a fuel stop are considered.

Next, the Scheduling Department has to look at the requested timings and slot the booking into the right fleet, taking into account aircraft and crew availability, flight time limitations, etc. They do the planning every day that airlines do once or twice a year; it is impressive. Once this has been coordinated, other departments will action a myriad of other requirements.

Flight Dispatch provides the flight crew with computer flight plans for every leg, NOTAMS and a thorough paper and telephone weather briefing. NetJets Europe believes that its flight crews should have as much time and freedom as possible to carry out the most important aspect of their jobs properly, ensuring our passengers' safety. The Catering Department make sure that the Owner gets his individually requested menu delivered fresh and on time to the aircraft whether he is departing from Milan or Mogadishu. Ground Services makes sure that there is a limousine or helicopter to meet the Owner on arrival and the Travel Department will make sure that there is transportation and a hotel for the crew at the end of the day, or a flight home if it is the end of their tour.

Recruitment

Our operations peak in early summer, so, as for many airlines, recruitment is scheduled to get pilots on line prior to this busy period. Candidates are screened at a panel interview, which includes a short technical questionnaire. If they are successful they then have a simulator assessment, of which allows them to be evaluated based on how well they work together in the cockpit and how they cope with extremely high workload situations.

We only accept pilots with full ATPLs; candidates must have a minimum of 1,500 hours flying experience to be considered for employment. We do not hire direct entry Captains all our pilots, regardless of experience, join as First Officers and have to learn the ropes with a seasoned NetJets pilot sitting next to them. Promotion from that point on is on merit and performance and not seniority, although in order to upgrade to Captain we require our pilots to have a minimum of 3,000 hours.

Training

Successful candidates attend a two week "Indoctrination" course in Lisbon which covers NetJets Operations, Crew Resource Management, First Aid (we use Med Link for any in-flight medical emergencies and all of our larger aircraft carry de-fibrillation kits), Safety and Emergency Procedures, smoke and fire training plus ditching operations. Trainees then attend initial type-rating courses. For this we use FlightSafety International, the world's largest provider of pilot training programmes.

Of equal importance as the initial training is the quality and frequency of on-going training. We ensure that the skills acquired during initial training sessions are constantly revisited and fine-tuned by recurrent six-monthly training sessions involving 12 further hours in the simulator and an aircraft handling test. This is far above what current European regulations require. Special airport operations, such as at Innsbruck or Chambery, are covered during this six-monthly recurrent training. Currently, most of the simulators are in the USA, but a new FlightSafety centre is opening in Farnborough this year and we will transfer the majority of our training to the UK. Our extremely rigorous upgrade training programme is run entirely in house.

Flight Operations

The crew arrive at the handling agent one hour and thirty minutes before any departure with Owners on board, and one hour before departure if it is a ferry flight. This is to allow for a comprehensive review of the day's flight package, weather and NOTAMS and a review of any special airport information if relevant. It is rare to be able to load maximum fuel the day before as the plan often changes overnight, so final fuel uplift is normally decided on the day. We take into account performance and also tankering options, especially for airports where delays might be expected or where a quick turnaround might be advantageous. We do not have a "minimum" fuel policy – we encourage maximum flexibility!

The aircraft will normally have been left in a good condition from the evening before (we have specialist cleaning teams at our most frequently visited airports, but it is also the crew's responsibility to ensure the entire aircraft is left in pristine condition). The crew then do a through exterior and interior pre-flight inspection, request fuel if necessary and load the catering. Our standard requirement is for the aircraft to be fully ready 30 minutes before departure, and one pilot to be in position to meet the Owner when he arrives at the airport. If the Owner is late we need to liaise closely with Flight Dispatch for any revision of the flight plan and associated ATC slot. By the very nature of our operations, we sometimes increase the flow of air traffic into and around certain airports by up to 40-50% in any one day, for example during the Cannes Film Festival, Davos World Economic Forum or the Football World Cup. Consequently, we are the only company that regularly attend Flow Control meetings at the Eurocontrol Headquarters in Brussels to help ensure safe and orderly arrivals and departures in such circumstances.

When the Owners arrive they are escorted to the aircraft, their luggage is loaded, and they are given a safety briefing either by the Flight Attendant or by one of the pilots. On our larger aircraft we carry a flight attendant, on the mid-size and smaller fleets we do not. We have an open door policy so we can easily communicate with our Owners in flight. If we need to divert due to a change of the

NetJets Falcon 2000

NetJets Hawker 800

Owners schedule for example, or due to weather, and it is safe to do so in the cruise, we discuss the possible options directly with the Owners; they often have preferred diversion alternates. Indeed, if the weather was looking marginal prior to departure, then much of this would have been considered on the ground, with standby transportation arrangements for the Owners pre-booked at the alternate airfield.

By the very nature of our sometimes complex operations, we need our crews to be pro-active if things change unexpectedly. All our aircraft are equipped with satellite telephones so it is very easy to liaise with Flight Operations if any unforeseen events occur during the flight. Technical advice and support is available at the touch of a button. We have experienced fleet managers available 24 hours a day to help the crews with any problems they encounter.

Technical

With a schedule that changes daily and no home base for the aircraft, we have different challenges to normal airlines when it comes to organizing aircraft maintenance. When a maintenance check approaches for a specific airframe this is noted on our computer system and the Scheduling Department will take this into account, ideally planning a revenue flight to operate into a maintenance base or else a short positioning flight. We have a large number of manufacturer-approved service centres across Europe including the NetJets-operated maintenance base in London. With 42 full-time technicians and engineers, the London maintenance facility provides top line maintenance 365 days a year. In 2004, it became the first facility of its type to receive full approval from the European Aviation Safety Agency (EASA). NetJets's Lisbon-based Maintenance Department is staffed with 35 licensed controllers and aeronautical engineers, with an average of 18 years industry experience. Their job is to ensure that all maintenance is performed on schedule and to NetJets's exacting standards.

We also get our fair share of unscheduled maintenance. As in any airline, a fault gets written up in the Tech Log and the MEL is consulted. With so many aircraft, we normally have the flexibility to reschedule another aircraft (not necessarily from the same fleet) to pick up a revised programme. For example, when one of our pilots had a tyre problem at Stanstead earlier this year, the replacement aircraft arrived promptly, and the passengers left within one hour of the scheduled ETD.

The Safety Department

NetJets Europe has an active flight safety department dedicated to maintaining its excellent safety record. There are two full time Safety Officers based in Lisbon whose job is to monitor daily operations, identify potential problems and to resolve them in a timely manner. There is an Air Safety Committee (ASC) made up of pilots from every fleet and aircraft type, plus cabin crew, flight dispatchers and maintenance engineers. The Committee meets regularly to ensure a pro-active approach to flight safety, discussing potential safety and security scenarios before they occur. The ASC reports directly to the Safety Review Board, made up of senior management, who provide the support and resources necessary to implement the ASC's recommendations.

NetJets Europe also operates an industry-standard Air Safety Reporting (ASR) system within which pilots are encouraged to report any event or observation from which they believe a safety lesson can be learned. Reports are voluntary and the confidentiality of the author is normally assured. As leading safety analysts have proved, active ASR systems increase the safety level of the organisation and lower the operational risk. NetJets Europe has a thriving ASR system and its contribution has proved invaluable.

In 2004 NetJets Europe became the first dedicated business jet operator in the world and only the eighth European airline to be granted the IATA Operational Safety Audit (IOSA) certificate for safety. The IOSA is the internationally recognised gold standard evaluation system, designed to assess the operations management and control systems of an airline.

Conclusion

Our aim at NetJets is to not only reach the safety standards imposed by the Portuguese Aviation Authority (INAC) and the JAA but to surpass them in order to set a higher standard for safety within the industry. As a business jet operator we strive to offer a unique and unparalleled approach to safety management in the ever changing environment that we operate in.

UK FLIGHT SAFETY COMMITTEE

AVIATION SAFETY - LOOKING AHEAD 20 YEARS

Annual Seminar 2005

3rd & 4th October 2005

The Radisson Edwardian Hotel, Heathrow

SEMINAR OBJECTIVE

If you want to understand more about the problems, and consider solutions, created by the development of: Aircraft Systems, Aircraft Types, Crew Composition, Legal & Regulatory issues, Air Traffic Management, Engineering, Training, Ground Handling and Security then you must attend this Seminar.

PROGRAMME

3rd October 2005

2000hrs Seminar Dinner
After Dinner Speaker - Ken Smart

4th October 2005

0800 - 0900	Registration
Session Chairman - Ian Crowe - Willis	
0900 - 0915	Welcoming Introduction - Stuart McKie-Smith - Chairman, UKFSC
0920 - 0955	Keynote Speech - Dr Kathy Abbott - FAA
1000 - 1035	ATM Future Development - John Levesley - GATCO
1035 - 1055	Refreshment Break
1055 - 1115	Setting the Sights for the Future in a Changing Environment - Thor Johansen - Boeing
1120 - 1155	ICAO'S Multi-Crew Pilot Licence (MPL) - Graham Forbes - CAA
1155 - 1230	Questions
1230 - 1340	Lunch
1340 - 1415	Human Factors in Aviation - John Chappelow - Qinetiq
1420 - 1455	Airport Development & Ground Ops - Peter Hampson, Airport Solutions Ltd
1455 - 1510	Comfort Break
1510 - 1545	Passenger Handling & Airport Security - Richard Doney - TRANSEC
1550 - 1625	The Legal Minefield - Simon Phippard
1625 - 1655	Questions
1655 - 1700	Closing Speech - Chairman UKFSC

SEMINAR INFORMATION

- Hotel Accommodation

  Hotel Accommodation is not included in the Seminar Registration Fee. If you require accommodation please contact The Radisson Edwardian Hotel direct on Tel: +44 (0) 20 8759 6311 and quote Block Booking Code 1003 UKF when making your reservation.

- Seminar Dinner

  Dress for Dinner - Black Tie

- Cancellations/Refunds

  Cancellations received prior to 9th September 2005 will be refunded 50% of registration fee. Refunds after this date will not be given.

SEMINAR REGISTRATION FORM

Please complete in full one registration form per person. (Photocopies accepted)

(Please print clearly)

First Name: Surname:

Company: Job Title:

Address:

Tel No: Fax No:

e-mail:

PAYMENT INFORMATION

Fee: £175 UKFSC Member ☐ £225 Non-UKFSC Member ☐

This includes the Seminar Dinner on the evening 3rd October, lunch, refreshments and car parking. This does not include hotel accommodation - please see 'Seminar Information'.

Payment is by Sterling cheque only. No credit cards are accepted. Bank transfer is available, details on request (please note an additional cost of £6 will be added to cover handling charges). The UKFSC is not VAT Registered.

Sterling cheques should be made payable to UK Flight Safety Committee.

- Do you plan to attend the Seminar Dinner on Monday 3rd October? Yes ☐ No ☐
- Do you require a Vegetarian alternative? Yes ☐ No ☐

PLEASE SEND YOUR COMPLETED REGISTRATION FORM WITH YOUR CHEQUE TO:
UK Flight Safety Committee, Graham Suite, Fairoaks Airport, Chobham, Woking, Surrey, GU24 8HX.
Tel: +44 (0)1276 855193 Fax: +44 (0)1276 855195 email: admin@ukfsc.co.uk
Confirmation will be sent to you on receipt of your Registration Form and payment.

UK FLIGHT SAFETY COMMITTEE

AVIATION SAFETY - LOOKING AHEAD 20 YEARS

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