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The second European Safety Symposium

From Error Management to Safety Management

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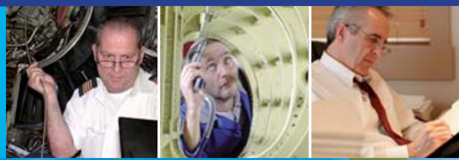

Following the resounding success of last year's first Error Management Best Practice Symposium, we are pleased to announce the event will be held again for a second year.

The event will be especially relevant to organisations making the transition to a formal Safety Management System (SMS), and those holding or seeking MAOS approval to Mil Part-145, with its embedded Error Management System (EMS) requirements.

The symposium is aimed at sharing organisations' experience, best practice, ideas and key lessons learnt in EMS and SMS implementation. The objective is to assist delegates to gain an understanding of 'real world' approaches and initiatives through open discussion and sharing experiences.

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Contents

The Official Publication of THE UNITED KINGDOM FLIGHT SAFETY COMMITTEE ISSN: 1355-1523 SUMMER 2009

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.

Editorial Office:
The Graham Suite, Fairoaks Airport, Chobham, Woking, Surrey. GU24 8HX
Tel: 01276 855193 Fax: 01276 855195
e-mail: admin@ukfsc.co.uk
Web Site: www.ukfsc.co.uk
Office Hours: 0900 - 1630 Monday - Friday

Advertisement Sales Office:
UKFSC
The Graham Suite, Fairoaks Airport, Chobham, Woking, Surrey GU24 8HX
Tel: 01276 855193 Fax: 01276 855195
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Web: www.wokingprint.com

Front Cover Picture: Thomson Airways are proud to announce their latest arrival G-FDZS which has joined the B737-800WS Fleet in the new airline livery. ZS is the second -800WS delivery this year and has joined ZR on the Thomson Airways frontline. This picture shows ZS arriving back at Boeing Field in Seattle prior to its non-stop delivery flight to the UK.

The Information Challenge: Are Pilots being provided with the necessary knowledge?

by Rich Jones

When I first heard about an incident involving a crew of considerable experience who had failed to recognise an apparently straightforward engine surge just after take-off, believing it instead to be a serious engine mechanical failure, I was initially a little surprised and immediately jumped to conclusions. In line with expectations, driven by the regular 'tick box' feature of the simulator ride, the crew undertook a text book, total engine failure - with all of its expensive consequences for the passengers and the company.

But on further reflection, I reached a different conclusion which triggered another important question. As a result of the much improved reliability of today's commercial aircraft, exposure to serious technical malfunctions is now rare. The conundrum is how to best provide pilots with the technical knowledge and the depth of understanding, often beyond that provided at initial training or type conversion, to deal with such uncommon and complex emergencies and avoid the consequential cost or worse - an accident.

In considering this issue, the introduction of the Alternate Training Qualification Programme by the CAA is a welcome development. It has the real potential to play a valuable part here – by providing a more flexible, role, fleet and type specific training alternative, and by getting us away from the limited effectiveness of today's 'tick box' training approach. But this fresh look at a more adaptable training regime could also be an important opportunity to communicate other important aviation information beyond emergency situations.

For example, how do you communicate your standard operating procedure changes, new routing, airspace and airfield information to your crews? En route, airspace and airport changes are numerous and common – and crews need time to assimilate them. Mergers too are regular occurrences these days and every SOP change will require a transfer of knowledge to the employees from both participating companies; a training and communication strategy, along with sufficient time to deliver it, is essential.

Of equal importance in terms of communication, how do you alert your crews to incidents and accidents involving your

airline, and those of other airlines who operate similar aircraft types, fly in the same airspace and use the same international airports? Your company's SMS and safety assurance programmes should be able to provide much of this information from your own company's data, but feedback from the CAA MOR scheme and from the regular UK Flight Safety Committee exchanges and other safety forums can help identify the mistakes of others, and save you the trouble and expense!

Needless to say, a key ingredient of effective safety management is to develop the right safety culture throughout your organisation – where mistakes are freely reported – this proactive approach will provide the life blood from which to make an accurate assessment of the current risks in your business and trigger their mitigation. It will also help reveal the new risks and hazards which will arise in any future changes in your business plan.

The close relationship between aviation and safety is not new. In a letter to his father, Wilbur Wright wrote:

'In flying, I have learned that carelessness and overconfidence are usually far more dangerous than deliberately taking accepted risks'.

It is the deliberate and accurate calculation of risk, and the subsequent management of it, that is the essence of a successful approach to safety. My focus here is on the fact that risk stands between opportunity and profit – and I would suggest that if risk can be understood and managed well, then profit can be made. But how can risk be managed to best effect? – my response would be by truly making safety your No 1 priority, and not simply because it is the law or a regulatory requirement!

A regularly encountered and popular misconception is that safety simply costs money - some even consider it a complete waste of resources. My contrary view is that effective safety systems can and will save money – and significant sums too – through enhancing business efficiency. Here is why?

- Safety systems and the understanding of hazards demand a more detailed analysis of your business processes in order to identify the major risks involved. This analysis will then provide the necessary knowledge to standardise your processes, make them more consistent and thereby more efficient.

- In turn, this detailed assessment will allow your entire organisation to have a much better appreciation of your business processes and ensure that every individual involved in the process has a better understanding of their specific responsibilities and contribution.

- Through this detailed knowledge - this intelligent risk management approach to safety –resource allocation will be made easier and much more effective, whilst risk exposure will be reduced to the company, investors and insurers alike. In addition, this detailed information will enable the company to react more quickly when new business opportunities arise.

A comprehensive Safety Management System is good for business and provides strong evidence to underpin an airline's reputation. An airline's brand and its customer confidence is highly sensitive to the airline's approach to safety and it can take years to build. Take the current Qantas experience. Until two serious incidents last year, arguably neither of which were directly the airline's fault, Qantas was the oft quoted exemplar of the safe airline – now every turn-back is reported by the international press. The investment required to re-build reputations does not come quick or cheap.

UKFSC Chairman's Column

by Capt. Tony Wride, Monarch Airways

As I take over as the Chairman for the UKFSC I follow in the footsteps of some truly great characters that have filled the position in the past. I hope that whilst I am your Chairman I can serve you equally successfully and continue to keep the UKFSC at the forefront of Aviation Safety. Fortunately we have the team at Fairoaks who do all the work and certainly the CEO Rich Jones, seems to be active in just about everything safety.

I have always thought of the UKFSC as being a vital part of the UK Safety Culture and that the free and open exchange of information at our meetings has been beneficial. More importantly I believe that the Committee provides the ideal forum for collaboration on a number of Safety issues provided the members are willing to play an active part. At the May meeting I raised the possibility of working together to identify the main Generic Hazards to produce a UKFSC Hazard Register for the membership to use to help develop their own Hazard Registers. I was pleased by the support offered by the membership for this project and it will go ahead. In particular I was pleased to get the offer from the CAA to be involved in helping establish the key Hazards based on the research that they have done. Without something like the UKFSC leading the way would such an initiative have happened? I doubt it and it is because we are a group of like minded individuals with the same goal of maintaining and improving Aviation Safety that it can go forward.

Judging by what's happening on the global financial front I do wonder if I might have picked up a poisoned chalice! All areas of aviation are under immense pressure to reduce costs and we have already seen the sad demise of some airlines and UKFSC members. I hope that we won't see any more and that the road to recovery is just around the corner.

In these troubled times the 'poor', no aspersion intended, Accountable Manager has the unenviable task of trying to maintain a profitable organisation and invariably to survive he or she will have to make difficult choices. As they try to balance the books everything gets reduced to a cost item and the solutions employed often result in people joining the dole queue. No one, or department, is safe from the cost cutting exercise and my biggest concern is that even Safety departments are not immune from the cost scrutiny. The problem is, and always has been, how can you cost safety? It is possible for the Accountable Manager to work out exactly what it is costing to pay for the various members of the SMS team, the cost of the various software programmes to manage reports and FDM, and the cost of the Quality audits. All the Accountable Manager sees is that safety is costing money and does not bring in any revenue to offset these costs. For the Safety Manager there is the difficult task of justifying the costs and the impossible task of trying to prove to the Accountable Manager, and the Board, that it is money well spent.

To make matters worse the new requirements for a Safety Management System, which came into force in January, have increased the workload for the Safety departments and will no doubt require additional resources to fulfil the requirements. So you now have the Safety Manager going to the Accountable Manager and asking for more resources at a time when everything else is being cut back!

So is the cost of a Safety Management System money well spent? First let's make a statement of fact - "S**T HAPPENS!" Just look at three recent events, Heathrow (B777), Ciampino (B737), and Hudson River (A320). Luckily no one was killed in these three accidents but all three serve to demonstrate that you can't assume that your operation is bullet proof. Could any of the 3 incidents been avoided if more resources had been available to the SMS departments of the airlines concerned? It is almost impossible to know either way because all three airlines do have active Safety Management Systems but lets just change a couple of the facts. What if the lack of thrust on the B777 had happened a few seconds earlier and the crew had not been able to make the airfield? What if the B737 crew had not been able to control the aircraft and it had stalled onto the runway, like the Amsterdam B737 into the field? What if the A320 had taken off on a day when the cloud base was 200ft and the crew couldn't see the river? All of a sudden the 3 accidents become major disasters and everybody, especially the lawyers (don't you just love them!), will be scrutinizing the individual airlines looking for someone to blame. In the UK, under the Corporate Manslaughter Act brought in last year the Accountable Manager and the Directors are the ones that will be held responsible if it can be proven that they have failed to take all reasonable steps to prevent an accident. The obvious area for scrutiny will be the Safety Management System and therefore this is the one area where, I suggest, you cannot afford to cut costs. It will be no use standing up in court when one of your aircraft has crashed killing 120 people and saying "We haven't had an accident in 30 years of operating." The Accountable Manager and the Board will have to demonstrate that they have actively supported and adequately resourced their SMS if the airline is to survive the accident.

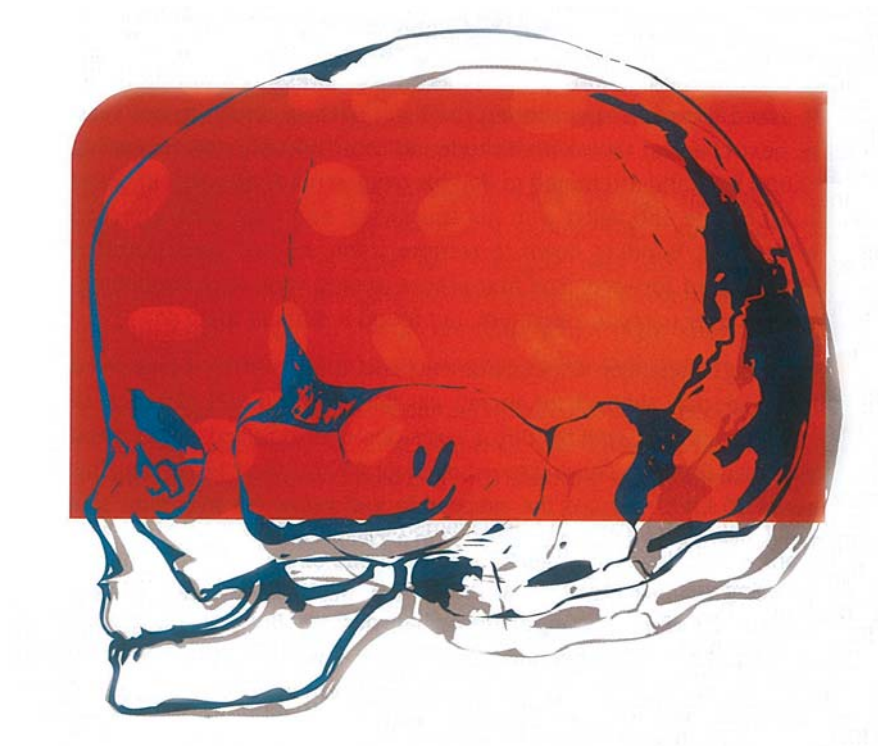
The new SMS requirements make it absolutely clear that Safety has to be the highest priority for the Operator and that profit comes second. Resources must be adequate to fulfil the task and ALL employees must regard safety as the key to the success of the business. Wait a minute I've just gone from having a go at the Accountable Manager to involving ALL employees! That's because although the Accountable Manager will be the one in the dock everybody within a company has a vital role to play in maintaining Safety and therefore preventing the accident.

My message is simple and is valid not just to the people holding the purse strings but to everybody involved in aviation.

If you think Safety Costs, Try an Accident!

Hypoxia Alert!

BOEING 737 CREW AFFECTED IN FLIGHT In light of the recent Qantas depressurisation incident, Macarthur Job looks at an historical incident with some lessons for today.



Readers may recall a fatal accident just over two years ago when a Cyprian Boeing 737 failed to pressurise on climb and its crew became incapacitated from hypoxia. Similar circumstances overtook a Beech 200 Super King Air en route to a mining site in Western Australia several years before. In both cases the aircraft flew or autopilot for several hours until their fuel became exhausted.

More recently an incident came to light in which a British-registered Boeing 737-200 suddenly lost cabin pressure over the English Channel during a return flight from Central Europe. The captain and the senior flight attendant both lose consciousness. But thanks to the first officer having donned his oxygen mask promptly, tragedy was averted. (Based on report published by UK Air Accidents Investigation Bureau)

The Flight

With a crew of two pilots and four flight attendants, the Boeing 737, G-SBEB, left London's Gatwick Airport at 3pm for a scheduled return flight to Dubrovnik in Croatia, arriving there just after at 6pm. The return flight, with 115 passengers on board, left again an hour later and was uneventful until only 10 minutes before the planned time of descent into Gatwick.

While over the Channel between Ostend and Dover, with the Boeing cruising at Flight Level 350 (35,000 feet) on autopilot, the captain left the flight deck to go to the toilet at the rear of the passenger cabin. On his way back, he invited a woman passenger he knew to come to the flight deck.

Not long after he resumed his seat, Air Traffic Control instructed the aircraft to descend to FL 280 (28,000 feet). The first officer who was flying the aircraft, carried out the descent checks, and closed the thrust levers to begin the descent. (The Boeing 737200 is not equipped with an automatic throttle system). But before he could lower the nose, he was distracted by feeling a pressure change in his ears, and he checked the cabin pressurisation panel above his head. To his alarm he saw the cabin rate of climb indicator needle at the top of its scale, a maximum rate of climb reading. Pointing this out to the captain, he immediately switched the pressurisation selector to the standby system in an attempt to control the rate of cabin climb. Manual control of the outflow valve is required if the cabin pressure remains uncontrolled in the standby mode, so when the first officer saw the standby system was having no effect, his first action was put on his oxygen mask, which he managed without difficulty.

As soon as the captain realised there was a pressurisation problem, he asked the passenger visiting the flight deck to return to her seat. He next checked the cabin altitude indicator himself, saw it reading 20,000 Feet, and attempted to don his oxygen mask also. But in doing so it became entangled with his spectacles, and they were knocked to the floor. Bending down to retrieve them, he lost consciousness and slumped forward. The first officer, seeing what was happening, reached over to try to assist him, but found it difficult to do so.

Returning his attention to the instrument panel, the first officer was alarmed then to see that, although the aircraft was still being held at FL 350 because it was on autopilot, with the thrust levers closed its indicated airspeed had decreased from the cruising speed of about 250 knots to 180 knots. This loss of 70 knots reduced the airspeed to well below the minimum safe manoeuvering speed for a Boeing 737 in a 'clean' configuration.

Lowering the nose to regain airspeed, he transmitted a MAYDAY call to Maastricht ATC, requesting an immediate descent. But his transmission was blocked by another aircraft and there was no response from the controller. The first officer repeated his emergency calls and the aircraft was cleared to descend to FL 250.

But with this level insufficient for an emergency depressurisation descent, he repeated his MAYDAY call with a greater sense of urgency, twice more requesting 'immediate descent'. The controller repeated the clearance to FL250, but advised that if the aircraft were to turn right, it could descend to any level. The first officer then transmitted again, informing ATC that several people were unconscious. The aircraft was then cleared for descent and given a radar heading.

Working in the forward galley at the time the cabin lost pressure, the senior flight attendant sensed the change in her ears, heard a 'bang', felt 'a rush of air', and saw 'misting' taking place around her. Recognising the symptoms of sudden decompression, she immediately opened the panel in the ceiling to gain access to a crew oxygen mask, and fitted it to her face. Meanwhile, back in the cabin the passenger oxygen masks had automatically fallen and were being donned by all the passengers. The passenger returning from the flight deck sat down in a vacant seat in the front row of the cabin and also put on an oxygen mask.

Using the cabin call chime, the first officer summoned the senior flight attendant. But to enter the flight deck she had first to remove her oxygen mask. Although she knew a portable oxygen set was stowed in the overhead lockers above passenger seat Row 8 in the cabin, she decided not to delay responding to the call, and went straight to the flight deck.

Pointing to the inert captain, the first officer signalled to her to try to assist him. But before she could do so, she too collapsed. With the senior flight attendant now lying on the floor by the flight deck door, the first officer had no alternative but to again try to fit the captain's oxyen mask. This time he succeeded.

Once the captain was breathing oxygen he quickly regained consciousness. His first action on doing so was to activate the speed brake to increase the aircraft's rate of descent. He then tried to speak to the first officer through the intercom, but was in fact transmitting to ATC. And he could not hear ATC's response above background noise because he had unintentionally switched the audio selector for his headset to ADF identification. The captain had no idea he had lost consciousness, and didn't learn he had done so until after the aircraft landed.

At this stage the first officer looked back through the open flight deck doorway, caught the eye of another flight attendant, and motioned to her to assist her colleague, who was still lying where she had fallen. Bringing forward a portable oxygen set, she administered oxygen to the unconscious senior flight attendant, who soon recovered sufficiently to return to her crew seat.

Soon afterwards, ATC instructed the aircraft to contact the London ATC Centre, and passed the required frequency. When the first officer did so, the London controller asked if he was declaring an emergency.

The first officer affirmed the emergency and requested radar vectors for an ILS approach into Gatwick Airport. Meanwhile by this time, the captain had resolved his radio communication problems, and after several minutes, was able to take over ATC communications from the first officer. This he did as the aircraft was descending through FL 110.

The aircraft continued to Gatwick Airport where it made an uneventful approach and landing. It parked normally at a terminal 'finger', and the passengers disembarked. Once inside the terminal building they were offered medical assistance. The aircraft captain and four passengers were taken on to hospital for further treatment.

Investigation

The Boeing 737-200, G-SBEB, was 24 years old and had flown mor than 86,000 hours. Its crew were well experienced. The captain, 60 had nearly 19,000 hours, of which more than 8000 were on Boeing 737 while the first officer had more than 1500 hours, of which over 100 were on type.

The aircraft's flight data recorder (FDR) when read out yielded detail of altitude, airspeed, heading, pitch and roll attitude, power, and acceleration during the flight, but not cabin pressure. There was thus no record of exactly when the depressurisation occurred.

The data showed that while cruising at FL 350, power was reduced on both engines and the airspeed decreased, reducing to 180 knots after two minutes. The pitch attitude then reduced by 10° and the aircraft began to descend at 4000 feet per minute with the airspeed increasing to a maximum of 373 knots well beyond the maximum safe airspeed. At 18,000 feet the rate of descent had reached 7000 feet per minute. These figures from the FDR suggest that in the heat of the moment, the first officer, no doubt distracted by chaotic conditions on the flight deck, allowed the aircraft to descend at an angle well beyond that required for an emergency descent. The time taken to descend to 14,000 feet was four minutes and 15 seconds; the aircraft continuing to descend to 8000 feet for a further two minutes. During this time it turned left from a heading of 300°magnetic on to 250°.

The line maintenance contractor to the aircraft operator conducted the initial investigation into the loss oF cabin pressure. When an attempt was made to pressurise the aircraft on the ground, the lower aft corner of the aft cargo door was found to be gaping open by about 12mm at a cabin pressure of only about two psi. And it was not readily possible to pressurise the aircraft Further.

Examination of the door, which opens inwards into the baggage hold, revealed a crack in the door frame at the aft lower corner. The crack extended along the radius between the outer skin attachment flange and the sidewall of the door frame. The crack was only visible when the door was opened, insulation removed from its inner Face, and the skin strained by pushing it outwards from inside.

The door was removed from the aircraft and taken to the engineering company responsible For the company's maintenance. Here it was examined under the supervision of an air safety investigator. After the door's inner skin was removed, the cracked lower aft frame section was cut out and the pieces subjected to detailed metallurgical examination.

This revealed that the cracks in the frame, extending over a length of about 25mm, began as a result of fatigue in the inner radius bend in the frame. When the cracking reached the outer surface, the frame metal began tearing, extending to about 30cm in a very short time. A crack in the web of the beam had also propagated by high cycle tensile fatigue. Its origins were at a rivet hole.

At the time of this incident, the aircraft had flown a total of 35,385 flight cycles. During this period the cargo door had been the subject of two service bulletins (SB), requiring inspection of the stop fittings attached to the upper and lower beams of both forward and aft cargo doors, and their replacement with new specification fittings. At the time the first service bulletin was incorporated, the aircraft had flown some 12,000 flight cycles over 25,000 hours.

Polysulphide compound found in the discovered cracks showed that they had already propagated an appreciable distance when the compound was applied to the joint of the fitting on its replacement in accordance with the first service bulletin. The cracks had obviously not been noticed. Even so, subsequent inspections required by the second service bulletin should have discovered them. This SB called for inspection of the cargo door frames and recommended fitting reinforcement angles to the frame corners before 75,000 flight cycles had been accumulated. This second inspection was performed when the aircraft had flown 34,460 flight cycles over 84,772 hours.

The investigation showed that although the cracking in the door frame was extensive, it was difficult to see, particularly with the door opening inwards, because its location was obscured. However, the cracking was readily visible through the lightening holes in the door's inner skin when the inner lining was removed. It was evident that the cracks had existed for many years without being detected, despite the fact that the door had been modified 17 years previously, and been subject to relevant inspections a year before the incident.

Oxygen Equipment

The aircraft's passenger oxygen supply is a continuous flow system using a pressurised cylinder with masks automatically released when the cabin altitude reaches 14,000 feet. The masks are activated when pulled down to the face. The oxygen supply is diluted by cabin air with each breath and the masks have a transparent plastic bag in the supply line to conserve any unused oxygen. This caused concern among some passengers who thought that when the bag was empty the oxygen supply had failed.

There are four crew oxygen stations on the Flight deck, one outboard of each pilot seat, and one outboard of each observer's seat. Each has a supply switch and pilots are required to check their masks and regulators before flight. There is no requirement for the other two masks to be tested before flight, unless the observer seats are occupied.

The aircraft was also equipped with four portable oxygen sets, two located above passenger seat Row 8 and two at the rear of the cabin.

Hypoxia

In cruising flight at FL350 the Boeing's cabin altitude is normally maintained at 8000 feet. The company's safety and emergency procedures manual quotes 'times of useful consciousness' to be expected at different cabin altitudes. For a sudden change to 25,000 feet, three to four minutes is quoted, while in the case of changing suddenly to 30,000 feet, only one minute is quoted.

But time of useful consciousness' is relative and varies for individuals, the most significant factor being the level of activity being undertaken. A time of one minute does not imply a person will remain fully capable for all that time. Initially a person will be able to carry out multiple tasks. But performance quickly declines and the individual tends then to focus on one task, not necessarily the most important. Once recovered, it is not unusual for the person concerned to be unaware of having suffered reduced consciousness.

Discussion

This incident occurred in an area of airspace where four different control sectors had to be co-ordinated for the emergency descent. The first officer's Mayday broadcasts were blocked by other transmissions initially-- doubtless the reason why the controller did not acknowledge them. Only after the first officer transmitted a third Mayday call, in which he told the controller several people were unconscious, did ATC clear the aircraft to descend, with an associated radar heading.

There was thus a delay in the first officer receiving the immediate descent clearance and radar heading he required, particularly in view of the captain's incapacitation. Blocked transmissions are of course always a potential problem during R/T communications in busy airspace sectors.

There was no record on the FDR of the actual cabin altitude attained during the incident, but there were several factors indicating the decompression was very rapid. The passenger's oxygen masks fell very shortly after the change in pressure was felt, and these deploy at 14,000 feet. And the fact that two of the crew quickly became unconscious suggests that the cabin probably reached an altitude in excess of 20,000 feet.

Because the two crew members succumbed so rapidly to the effects of the depressurisation, it is also possible that neither fully appreciated the nature of hypoxia. The term 'time of useful consciousness' could lead crew members to assume longer times are available than is actually the case. The 'window of opportunity' for donning oxygen masks, thus ensuring personal safety and thereby that of the aircraft, can be very limited indeed. This action must therefore take overriding precedence.

In view of the captain's experience in this serious incident, and his previous RAF training in a decompression chamber, it seems that even those who have had the benefit of this training in the past may still fail to recognise the urgency of donning an oxygen mask as soon as cabin pressure fails.

The Boeing Company reviewed past incidents involving pressure cabin cracking. The review showed that the final propagation of cracks in previous instances tended to take place over several flight pressurisation cycles, with the result that, once the cracks had grown sufficiently, it became impossible to pressurise the aircraft at all.

But in this case there had been no reports of difficulty in pressurising the aircraft during previous flights. This, and the fact that a very rapid depressurisation took place late in the flight, supports the metallurgical assessment that the final propagation of the cracking was by tearing.

Reprinted with permission Flight Safety Australia Jan–Feb 2009.

Reducing Smoke and Burning Odor Events

by James A. Holley, Service Engineer

At the recommendation of operators, Boeing has undertaken studies of smoke and burning odor (SBO) events occurring on airplanes. The studies provide fleetwide information so that operations can take steps to reduce SBO events.

Although most SBO events in the pressurized area of an airplane are resolved and rarely affect continued safe flight, landing, or egress, they are always significant issues with operational consequences. These consequences can include flight cancellations, flight schedule disruptions, air turnbacks, and airplane diversions. SBO events can also result in declared emergencies, airport emergency equipment responses, airplane evacuations, accommodations for displaced passengers, diminished goodwill, and extensive unscheduled maintenance following non-normal procedures, such as overweight landing inspection, recharging of oxygen, and repacking of escape slides.

In an effort to provide information that can help operators take steps to reduce SBO events, Boeing launched a series of ongoing studies of these events on Next Generation 737,747,757,767, and 777 airplane models. This article explains the scope of the studies and describes how the analysis is conducted, how the results are communicated, and how the results may be used. It also describes the use of an oil leak detection kit to assist ground crews in isolating the source of odors and provides an overview of appropriate flight crew response to SBO events.

Model-specific service letters present root causes and potential solutions for the most common SBO events.

MODEL	SERVICE LETTER
737	737-SL-00-023-A
747	747-SL-00-023-A
757	757-SL-00-018-A
767	767-SL-00-019-A
777	777-SL-00-012-A

Figure 1: Service letters on SBO events

Service letters addressing the issue of SBO events can be accessed through the Web portal MyBoeingFleet.com. Note: McDonnell-Douglas models are not included in the SBO study; however, similar service letters have been published for these models and are referred to as "smoke in the cabin."

SBO Studies initiated in 2004

Since 2004, Boeing has been examining events in which human senses detect a condition inside the pressurized area of an airplane that may result in a conclusion that there is a potentially dangerous ignition source or atmospheric contamination present that needs immediate corrective action. The studies exclude human visual or aural detection of automated alarms.

The SBO studies are ongoing investigations involving the models cited on the previous page, with reports released at least annually through updated model-specific service letters titled "Smoke and Burning Odor (SBO) Event Summary" (Air Transport Association of America [ATA] Chapter 0000-80). The reports address all SBO events reported to Boeing for the period identified in the service letter (see fig. 1).

Root causes of SBO events

SBO events were analyzed to determine the root cause for each event. Root cause was identified (when possible) down to the component level. Available potential corrective or preventive actions were correlated to the root causes and included in the service letters. Only the top root causes that account for approximately 30 percent of all the reported SBO events are correlated to corrective or preventive action.

The results of the studies were provided to operators in service letters that graphically show the predominant root causes (identified by root cause code [RCC] and description), as well as the occurrence count of the SBO event (see fig. 2).

Because not all SBO events are reported to Boeing, the number of occurrences in figure 2 should be treated on a relative basis. Each root cause is further broken down by an operational impact category, such as delay, diversion, or airplane on ground. Only the predominant root causes are shown in the chart. As a result, not all operational impact categories appear in figure 2. Also, events of undetermined root causes are excluded.

Suggested operator action

Operators can use the data provided in the associated service letters to initiate action at their discretion to reduce the occurrences of SBO events.

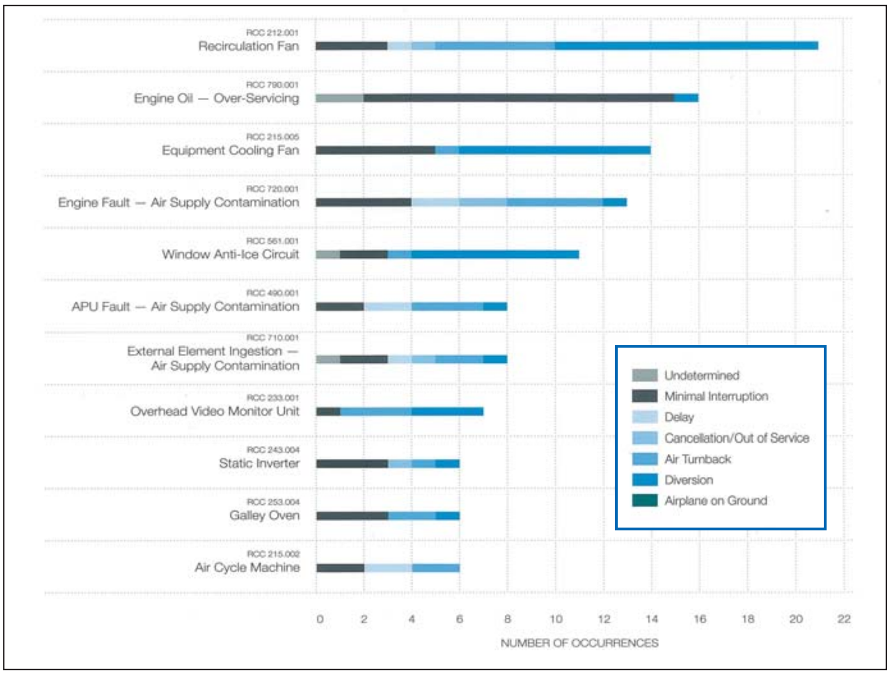


Figure 2: Study results for a given airplane model
Root cause codes (RCCs) and operational impacts of SBO events reported for the 757, July 2004 - August 2008.

The information provided in the service letters is intended for maintenance operations. Flight crew response to in-flight smoke, fire, and fumes is addressed separately.

Identification of Odor source

Most operators would like to locate and stop the cause of the Odor, which is often reported as an oil smell or aerosol Odor. It can be difficult to identify the Odor source, and troubleshooting can result in long airplane downtime and unnecessary engine or auxiliary power unit (APU) changes.

In response, Boeing has developed an oil detection kit that can be used to quickly identify the source of oil leaks or aerosol odors. The kit includes a bleed air sampler and portable infrared spectrometer. Ground crews connect the air sampler to the 3-inch pneumatic ground cart connector and run engine or APU bleed air through the sampler for 10 minutes. The spectrometer and a laptop computer are used to analyse the sample. The kit's software alerts the user when the sample matches a known contaminant, such as oil or hydraulic fluid.

The oil detection kit works for all Boeing models except the 787 and on all McDonnell-Douglas airplanes. The kit may be ordered online at the Web portal MyBoeingFleet.com by requesting part number J21 009.

Summary

SBO events can result in expensive operational interruptions. Boeing publishes the most significant root causes for SBO events and correlates these to potential corrective or preventive action in modelspecific service letters.

For more information, please contact James Holley at james.a.holley boeing.com.

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Why the reluctancy?

An article from JETSETS – the flight safety news for BAE Systems Regional Aircraft customers

The use of oxygen masks in the event of smoke or pressurisation failure.

Reading back numbers of the UK CAA Flight Operations Department Communications – I know, I should get out more! – I came across a communication that discussed smoke/fumes occurrences and the emergency procedures for cabin high altitude warning. These articles struck me as timely because recently we have had a couple of incidents during which the crew seemed reluctant to don their masks and goggles.

Reviewing the reports has made me ask: **why are crew so reluctant to don a mask?**

In one recent smoke/fumes incident the crew even had a therapeutic bottle and mask brought up for them to use if they felt any worse in spite of never having used the cockpit supply. There are two occasions where it would be prudent, and possibly even essential for life preservation, to use oxygen, and they are discussed in this article. You have two sources of oxygen available: there are therapeutic sets located round the aircraft for use by one and all and, much more readily to hand, there are the mask and goggles beside your seat for your exclusive use. I would like to discuss the use of the latter in the event of smoke or pressurisation failure.

We all need oxygen to survive. I am sure that we all remember, however vaguely, the reasons for needing supplemental oxygen at height, but I will cover them again briefly. The atmosphere contains 21% oxygen, 78% nitrogen and some trace elements. We all need oxygen to live, and the amount that we get at sea level is adequate for us. As the atmospheric pressure reduces with altitude the proportion of gases remains fairly constant, but the amount of oxygen that we can take in with each breath reduces markedly with decreasing pressure. The amount of oxygen in the air is usually given by the partial pressure of the gas. At a pressure of 1000hPa there will be 210 hPa of oxygen (21% of 1000). At 500 hPa (equivalent to about 20,000ft) there will only be 105 hPa of oxygen and at 300 hPa (equivalent to about 30,000ft) there will only be 63 hPa. So as you can see there will not be enough oxygen to keep us going at the higher altitudes (your aircraft oxygen system should be able to supply enough gas to maintain a partial pressure of around 122 hPa). Figure 1 gives times of useful consciousness, and is covered in more depth later. Do remember that the symptoms of hyperventilation, or over breathing, which is usually associated with intense stress or anxiety, can be very similar to those of hypoxia.

Smoke/fumes The QRH instructs you to put on the oxygen mask (with oxygen set to 100% - you do check that 100% is set on the first flight of the day don't you?) and goggles as part of the memory actions. This first action is to ensure that incapacitation does not occur although some manufacturers do allow some drills before going onto oxygen. The basic premise is that the crew are not best placed to diagnose the contaminant/source of the smoke, and the safety of the aircraft must be paramount and so the safest option has been chosen. Once on 100% oxygen the crew are protected from breathing any impurities, and should find that their performance is not impaired. Wearing the masks is less comfortable, and the mics are noisy. However, many pilots in the military get used to wearing a mask for every flight whereas for you it will only be for the remainder of the current flight. The smoke goggles also provide important protection as some contaminants can cause heavy eye watering leading to difficulties in seeing out of the cockpit, and so if separate goggles are provided they must also be donned. Having donned the masks and goggles there will be no cue as to whether to remove them before coming to a safe halt, and so they should be worn for the remainder of the flight. Don't be tempted to take them off if the smoke seems to have disappeared as there may still be some contaminant in the cockpit.

As we go to press a recent UK Air Accident Investigation Branch Bulletin 04/2008 (http://www.aaib.dft.gov.uk) contains a 'smoke' incident that occurred to an Embraer 145 during a scheduled operation. The first officer was PF. Shortly after take-off a warning sounded, the captain's displays went blank, and smoke appeared from the left side of his seat. The flight deck crew described this as a 'smoke haze' and they smelt an 'acrid burning smell'. A return to the departure airfield was initiated and the captain ascertained from the cabin crew that there was a strong smell at the front of the passenger cabin. The captain told the first officer that he was happy to continue without masks as there was only a little smell of smoke, and the first officer concurred. At no time during the incident did the crew put on their oxygen masks, instruct the cabin crew to put on their oxygen masks, deploy the passenger oxygen masks or refer to the QRH. The QRH contained memory actions which included donning masks, and donning the goggles. The captain commented that he did not put his oxygen mask on as there was only a small amount of smoke. After the smoke cleared, and having discussed it with the first officer, he did not want to put his oxygen

Above: smoke in the cabin, first priority is to ensure against crew incapacitation

Above: Boeing 737

mask on as he was concentrating on monitoring the first officer, thought it might 'hamper things', and did not want to cause undue concern to the passengers in the event of doing an announcement with the mask on. I leave you to draw your own conclusions from this.

Cabin high altitude warnings

There have been some well publicised accidents that have been caused by lack of pressurisation (and therefore inadequate oxygen) at altitude. Two that spring to mind are Payne Stewart and the Boeing 737 operated by Helios. You may recall that the professional golfer Payne Stewart was killed, along with 5 others, when his chartered Learjet crashed. Speculation centred on the possibility that the accident might have followed a decompression early in the flight with all onboard becoming incapacitated. Pilots of military aircraft who followed the Learjet after the crew stopped responding to ATC and climbed above their assigned altitude of 39,000 feet said that the aircraft's windows were covered with ice, and there was no sign of flight control movement. The Helios accident was a result of continuing to climb unpressurised to an altitude above which life could be supported without supplemental oxygen. Apparently the flight crew did not don their oxygen masks.

Can't happen to us? We've had a couple of reports recently where the packs were not selected ON and the aircraft continued the climb until the crew received a warning to indicate that they were not pressurised.

Not all of us are able to experience hypoxia at first hand in a pressure chamber or for real (many might not want to!), and so we have to make do with reading books or ground training. Those of us who have been in a chamber will remember how insidious the onset of unconsciousness was. Mostly we were given a simple task such as writing down a multiplication table or writing our name; when I went through a chamber run, and my oxygen was switched off, I felt all was OK till I woke up when the oxygen had been restored and looked at my pitiful attempt to complete the table and my scribbled writing. The most important lesson from this exercise that I learnt was: I was not competent to judge my condition. For this reason the first action on getting a cabin high altitude warning must be to don your oxygen mask.

The table opposite (copied from Wikipedia, but there are many similar tables published) gives indications of times of useful consciousness without oxygen: This table was probably calculated on a young fit person sitting down. Someone walking about would have less time (cabin crew?), and other factors such as stress, fitness, smoking and fatigue will also affect the time available to you. Certainly some published tables give less time at the heights above 22,000 feet.

How long will it take you to don your mask? For our turbo props there is a bit of leeway because they cruise at lower levels, but for the jets time may be of the essence. Tests have shown that pilots often take up to 15 seconds to don a mask. If you go unconscious you will probably regain consciousness within 30 seconds of oxygen being restored – but someone will need to be around to put your mask on for you. This should be your first action, you must not delay putting the mask on because the cabin altitude is only about 20,000 feet (as has happened) since you might not get a second chance!

Once you've got your masks on the aircraft must be descended to a level where the rest of the crew and passengers can breathe normally – this is usually 10,000ft or MSA if higher. The emergency descent configuration given in your QRH should ensure that the descent can be made in less than 4 minutes.

Altitude ft AMSL	Time
15,000	Indefinite
18,000	20 to 30 minutes
22,000	10 minutes
25,000	3 to 5 minutes
28,000	2.5 to 3 minutes
30,000	1 to 2 minutes
35,000	0.5 to 1 minute
40,000	15 to 20 seconds
43,000	9 to 12 seconds

Conclusion

I hope that this article has given you something to think about, and may help to save your life in the event you suffer a problem. These events are rare, and preparation and education can help us to reduce the possibility of them becoming more than an incident. I would be very interested in any feedback from you giving indications as to whether you feel crews are reluctant to don masks, and if so giving an indication of the problems.

Safety Culture in ATM – An overview

The term Safety Culture was first applied in the aftermath of the Chernobyl nuclear disaster in 1986. This nuclear power plant had trained operatives using clear procedures backed up by safety management systems, but deficiencies in the attitudes to safety in the organisation led to the world's worst nuclear disaster. Since 1986, the use of the term and approach has spread to other industries including Oil and Gas, Chemical, Rail, Aviation, Medical, and Air Traffic Management (ATM), where it has recently been applied to both the Oberlingen and Milan Linate accidents.

This Briefing Note answers the following questions:

- What is Safety Culture?
- Why is it important?
- How do you measure and improve it?
- What does it deliver?
- What does it cost?

What is Safety Culture?

Safety Culture is **the way safety is perceived, valued and prioritised in an organisation. It reflects the real commitment to safety at all levels in the organisation**. Safety Culture is not something you get or buy; it is something an organisation has. Safety Culture can therefore be positive, negative or neutral. Its essence is in what people believe about the importance of safety, including what they think their peers, superiors and leaders really believe about safety's priority.

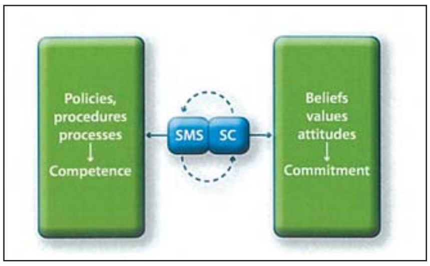
Why is Safety Culture Important?

Safety Culture can have a direct impact on safe performance. If someone believes that safety is not really important, even temporarily, then workarounds, cutting corners, or making unsafe decisions or judgements will be the result, especially when there is a small perceived risk rather than an obvious danger.

However, a typical and understandable first response to Safety Culture in ATM is:

'We already have an SMS, why do we need Safety Culture too?'

A Safety Management System represents an organisation's competence in the area of safety, and it is important to have an SMS and competent safety staff to execute it. But such rules and processes may not always be



followed, particularly if people in the organisation believe that, for example, 'moving traffic' is the real over-riding priority, even if risks are occasionally taken. Where would people get such an idea? The answer, ultimately is from their peers, but more so their superiors, including the person at the helm of an organisation, namely the CEO. To ensure the required commitment to safety, organisational leaders must show that safety is their priority.

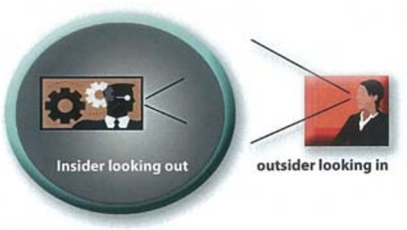
So, ANSPs need both a SMS and a healthy Safety Culture in order to stay safe. But here is a problem for ATM organisations - ATM is generally very safe, with accidents only occurring rarely. This means that almost all organisations will assume they are already safe. There may be few incident reports, and these may be of low severity; safety cases may be well in hand for current operations and future changes. Real ATM accidents are usually complex and multi-causal, so it is not always easy to see them coming. Even harder to see are contributing situations which affect an organisation's 'forward vision' in safety: e.g. under-reporting of incidents due to fears of recrimination or prosecution; people running risks because they believe that is what they are supposed to do; different sub-groups not sharing information due to a lack of mutual trust; etc.

If you want to remain safe, you have to know the realities of safety in your organisation

How would a CEO know if such undermining factors were evident in their organisation? By asking their directors? By touring the workforce and asking? The alternative, and more robust approach, is to carry out a Safety Culture survey; to measure Safety Culture.

How do you measure Safety Culture?

Safety Culture, like culture, is sometimes hard to see from the inside. It is like a fish swimming in water - the fish does not really think too much about the water. Therefore, usually Safety Culture surveys in most industries are a combination of internal and external perspectives: the 'outsider's view is used to help make objective the insider's viewpoint.



That being said, however, it is useful to have a 'champion' inside the organisation who will act as an interface between the survey professionals, and the internal staff, including the Board and CEO, as well as staff, unions, etc. This champion is typically the Safety Director or Safety Manager for the ANSP.

The survey usually proceeds as shown below:

It is a tried and tested process starting with 'prelaunch' discussions to explain the process, decide the breadth and copy of the survey, and to reassure the ANSP that the approach is:

- Anonymous
- Confidential to the ANSP
- Independent – not favouring any particular group

The survey process culminates in clear and concise actions being developed by the ANSP (with input from the Survey Team if required) with regard to developing a robust Safety Culture improvement strategy.

The overall timings of the approach are illustrated below:

As well as such 'macro' effects, the approach delivered more concrete advice on the incident analysis process, team training, and better integration of maintenance safety concerns with operational control safety priorities.

Another organisation sees Safety Culture as a key ingredients of their business transformation approach, and has endorsed a company-wide Safety Culture enhancement process – the people at the 'sharpe end' feel more empowered to act in the interests of safety, and know that the management will protect them to the limit. Trust has been enhanced. This has a positive impact on productivity, too.

A third organisation wanted to be sure of Safety Culture's validity as an approach, and so carried out two independent surveys. They found a very high degree of overlap in the results, and so are now working on the recommendations arising from both surveys, and considering the best timing for a further Safety Culture review to see how they have improved.

Each ANSP is different, and also has its own national cultural traits. What each ANSP therefore gets out of it will vary, but so far the ANSPs who have participated have valued its insights.

What does Safety Culture deliver?

For one ANSP, the survey has delivered a clearer and more comprehensive risk picture, one that takes in all regional aspects of the company. This has come about through a better information flow and a more realistic dialogue with whole company about safety.

A typical ATM model of Safety Culture is shown below:

What does it cost?

There are two cost components to the cost equation of Safety Culture. The first is the actual survey costs. Here there are three options. EUROCONTROL aims to support the enhancement of Safety Culture throughout Europe, and so is performing surveys at ANSPs request, within certain resource limitations. Secondly, a number of ANSPs have used Applied Psychology departments in various universities who specialise in Safety Culture, to adapt and apply survey techniques to their organisations. Third, there are consultancy services who carry out these types of surveys. Currently, EUROCONTROL is building a web-based 'Safety Culture toolbox' which will include information on all these types of 'Resources'.

The second aspect of cost is the provision of an organisation's own resources - its people - to participate in the survey, including the time of the 'champion' and administrative support to organise survey participation. This is more difficult to cost, but typically the questionnaire takes 30 minutes to complete for each participant (of which there may be hundreds), and around 20-30 people in total are involved in four separate workshops each taking half a day. There are sometimes additional interviews with Board members, and presentations and meetings after the survey to determine the way forward etc. Such resource requirements are not onerous, but do need to be timed so as not to clash with other potential initiatives.

Safety Culture can help refine the organisation's risk picture, and enable a sharper clarity on safety priorities. It can also help to enable the entire workforce to act and react safely, and make safe judgements on a day to day basis.

Further information

barry.kirwan@eurocontrol.int/antonio.licu@eurocontrol.int

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Fuel Saving – Food for thought...

by Captain Martin Alder – BALPA Flight Safety Group

We all understand that airlines are under pressure to reduce costs. One obvious one is the cost of fuel, which at the time of original writing was around 1500 USD per tonne or 1.50 USD per kilo. This has now fallen considerably, now being nearer 700 USD per tonne or a mere 50p a kilo at current exchange rates, but no one believes that it will stay low for long. You can monitor fuel prices at:- http://www.iata.org/whatwedo/economics/fuel_monitor/index.htm

With prices at such high levels compared to the relatively cheap 350 USD per tonne of only a few years back, we all need to look at ways of avoiding any wastage that can be safely done. However, there are times when narrowly considered ideas to reduce the amount of fuel used, may not achieve the intended aims, increase costs and may possibly adversely impact safety. We all appreciate how tempting it may be to promote great cost cutting ideas for career progression. However, if the fuller picture has not been considered, or some research in to the reasons why something has not been done before, then there is plenty of opportunity for the occurrence of unforeseen consequences. This may have already been seen in the past. In aviation, many things considered as new, have usually been done before and frequently with a great deal of creativity on each occasion.

With fuel and cost saving, there are ideas that may well appear to be very attractive, such as the peer pressure of league tables. However, fuel league tables have been tried several times in the last 30 years or so by a number of operators. What seems like a reasonable idea, almost inevitably turns into a competition and safety goes out of the window. One carrier, some 30 years ago, when Flight Data Monitoring was nothing like today, called a halt when things became so competitive that safety was becoming seriously jeopardised by individuals attempts to carry least and burn least. Given the somewhat more relaxed manner in which industry operated then, it must have been serious! More recently, another carrier had individuals reducing fuel significantly below minimum by unrealistic assumptions about diversion routes and fuel, in order to move up the league table. Sure, have a fuel awareness programme, but the best minds in safety in the industry all believe that league tables do not add to either safety or, reduce fuel costs. There are no doubt other ideas that may be applied in a manner which does not give the best overall result and detracts from the benefits that could be realised.

With fuel prices currently so high, the industry needs to look at safe ways of avoiding any wastage

Whatever is done, it must give tangible results, as just printing paper to appear to be doing something for our environmentally aware critics is frankly, doomed to be exposed and we will have a re-run of the noise scenario. For those who may not remember, the noise scenario was the tardy acceptance by the aviation industry that it created fairly anti-social levels of noise. There was a great reluctance by industry to solve this until forced to do so, with economic doom forecast if the technological measures available at the time were to be adopted, i.e. hush kits, of the type that have since been widely sold. It won aviation no friends and has in my view, tarnished the environmental image of aviation ever since.

So for the future, there are some things we can do. Some may be changes in how we do things and some with what we do things. The obvious things to look at first are those with little or no capital costs using existing industry good practise and the capabilities that exist now. Some longer term ones may require no new technology but some wider commitment by stakeholder, with changes in how we do things and some small capital investment.

Let us look at some examples of what may appear to give an easy gain, but may not always produce as much as expected.

Examples as, always departing packs off, when in the same written support for the procedure, information states that it is only of benefit when the first few degrees of de-rate from maximum EGT relative to maximum thrust are obtained. However, it is blindly done it for all flights, incurring additional wear on other parts and increased flight deck workload for little , if any real benefit. One engine taxi may not always save as much money as appears either, as taxi time is increased and dispatch cannot now realistically occur until after second engine start has taken place. Thus, any MEL item occurring before the final start up may now require a long taxi back and more time, cutting into benefits obtained. There will of course be the pressure to perhaps "not notice" the fault until after the second start, eating into safety assumptions.

Another element to be considered is the amount of thrust applied to the operating engine(s). This may not vary much with a 3 or 4 jet, but for a twin there tends to be greater thrust applied and more frequently. The levels of thrust can be significant and if not carefully done, have the effect of increasing the cyclic effects on the life of engine components. This will reduce the engine performance over time, hence reduce the time between overhauls and increase fuel burn. Nose gear side loads can also be significant large amounts of asymmetric thrust are applied and nose wheel tyre scrub can be expensive.

Of course, all of this depends on the aircraft type and in particular, its weight. On taxi out there is much more scope to require large amounts of thrust compared to taxi in. In addition, starting on the move, perhaps under time pressure, is not without its own issues, not least warm up times and the impact of one engine having a slightly more adverse life in terms of temperature shock if not carefully managed. So, what may be reasonable for taxi in may not always be so useful for taxi out. As ever it is a balance, especially if a long departure or arrival delay is foreseen, but blind following of a procedure may not always achieve good results in the long term.

Hold short for runway safety

ICAO defines a runway incursion as any occurrence at aerodrome involving the incorrect presence of an aircraft, vehicle or person on the protected area of a surface designated for the landing and take off of aircraft. BALPA and its US colleagues at ALPA have focussed their efforts on preventing runway incursions, excursions, and confusion. ALPA's associated website provides you with some commonsense guidance that will help prevent the operational breakdowns that can lead to incursions. Visit www.alpa.org/Default. aspx?tabid=3064 to find out more.

So, like all ideas, there are sometimes better times and places for all of the moves to saving avoidable costs than others. It comes down to the exercising of judgement and operators should provide sensible guidance to crews, rather than requiring slavish adherence. In my view the results ought to be better when people understand why they are doing something and what the trade offs are, so as not to do it when inappropriate.

Here are some ideas on what might be considered as ways of reducing fuel burn in a safe and reasonable manner, most used by some individuals or operators and which may be new to others. We had tried to create a suggested priority order, but that was difficult, so it is now split into what could be done now, with little or no capital investment and using what is already available and often done by some, but not all. Then we have things that still do not require capital investment but some wider agreement and finally any thoughts for longer term aims. For ease of reference they are just in flight phase order i.e. from planning to shutdown.

Some short term ideas for starters that could be done now, with more ideas to follow in Part 2:-

- Modern flight planning systems already provide accurate, airframe specific fuel burns and wind forecasting is very accurate too, so the basic planning data can give very accurate values when used with accurate route data. The operator need to ensure that the flight plans generated are continually checked and refined to ensure that they are optimised to reflect reality in terms of routing levels etc. This will increase crew confidence in using them to accurately predict the fuel needs.

- The fuel quantity loaded is always a sensitive issue, but with a sound understanding of what is needed and why, the extra fuel burn due to carriage of excess fuel above that actually required to complete the flight safely can be minimised. Thus, having confidence in the flight plan generated minimum fuel for a flight, crews need to reason through why any extra might be needed and how much that might be. Just having 15 minutes extra "in case" may not be of any benefit. For example, a runway blocked due to gear collapse on a Greek Island will not be cleared in 15 minutes for sure, as neither would that event at a UK single runway regional airport. So, carrying 15 minutes extra fuel on a perfect day to single runway airport appears to buy very little and just costs. On the other hand, a flight to a coastal airport with varying weather conditions close to minima may justify carrying some additional fuel to permit the execution of an additional approach after a suitable delay to minimise the probability of a commercial diversion, due to insufficient fuel to have a second go in improving conditions. Operator guidance in the C Manual (Route Manual for some) as to what additional fuel may be needed due to local traffic circumstances will also be helpful. It will be a matter of judgement as to what is sensible carried and why. Only carry what is justified, not just some for mother, wife and kids etc. A good operator may want to know why, after all, they are paying for it, so you may need to justify it. They may also have a fuel monitoring programme to see what is happening, but it must absolutely not be a league table.

- Intelligent use of ATC traffic management on the departure airfield to minimise taxi and time in the holding queues needs to be implemented. There is no real reason why, even a busy airport has a holding queue of more than 10 minutes, as that will provide a pool of 5 or 6 departures. Hold the rest on the gate. Having overall taxy times of 30 or 40 or so minutes versus 5 to 10 minute no delay taxy times on any airfield is not acceptable, especially if it in additions causes arrival taxy delays.

Autoflight Audit

Check-up targets efforts to mitigate complexity of flight guidance systems

By Wayne Rosenkrans

The Flight Deck Automation Working Group, a U.S. government-industry committee launched in 2006, is scheduled to complete next year an assessment of how well airlines have addressed safety vulnerabilities identified in flight deck automation, including the effectiveness of efforts to improve mode awareness during autopilot/flight director operation and to mitigate mode confusion.

Mode awareness/confusion has been described as situations in which "the flight crew believe they are in a [flight guidance system] mode different than the one they are actually in and consequently make inappropriate requests or responses to the automation" or in which "the flight crew does not fully understand the behaviour of the automation in certain modes, i.e., when the crew have a poor 'mental model' of the automation."[1] Sometimes, this is simply called losing track of the automation.

The subject has been studied for decades. "The current set of autoflight modes is large and has expanded over the years: A typical transport may have approximately 25 thrust, lateral and vertical modes," said a 2004 report by Boeing Commercial Airplanes researchers. "The complex rules behind vertical navigation and other modes sometimes make it difficult for pilots to anticipate aircraft flight path behaviour… Boeing research shows that some pilots incorrectly assume that all vertical navigation modes always take altitude targets from the flight plan [programmed into the flight management system]… Although the flight mode annunciation on the primary flight display highlights changes with a transient green box, Boeing research indicates that 30–40 percent of these changes go undetected."[2]

Previous solutions primarily focused on policies, procedures and training pending the adoption of new airworthiness standards for flight guidance systems – completed in 2006 in the United States – and the arrival of more human-centered flight deck technology.

The airline accident most often cited for raising consciousness of the mode awareness/confusion issue occurred in April 1994 when the flight crew of an Airbus A300 experienced loss of control and crashed during an approach to Nagoya, Japan (ASW, 10/06, p. 44). The U.S. Federal Aviation Administration (FAA) later said, "Contributing to that accident were conflicting actions taken by the flight crew and the airplane's autopilot."

A Broad Assessment

Established by the Performance-Based Operations Aviation Rulemaking Committee (PARC) and the U.S. Commercial Aviation Safety Team (CAST), the Flight Deck Automation Working Group's findings and recommendations are expected to help airlines, and otherspecified types of operators, optimize pilot training, among other objectives. The FAA said in May 2008 that this PARC/CAST working group is making progress but could not yet discuss its ongoing deliberations. In earlier communication, however, the working group said, "In the past decade, major improvements have been made in the design, training and operational use of on-board systems for flight path management (autopilot, flight director, flight management systems, etc. and their associated flight crew interfaces [Figure 1]). In spite of these improvements, incident reports suggest that flight crews continue to have problems interfacing with the automation and have difficulty using these systems. But appropriate use of automation by the flight crew is critical to safety and to effective implementation of new operational concepts, such as required navigation performance (RNP) and area navigation (RNAV)."

The working group also said that its scope of work includes updating and revising safety recommendations from a June 1996 report by the FAA Human Factors Team,[3] reviewing airline crews' recent experience with flight deck systems in situations such as RNP RNAV approaches and departures, analyzing recent

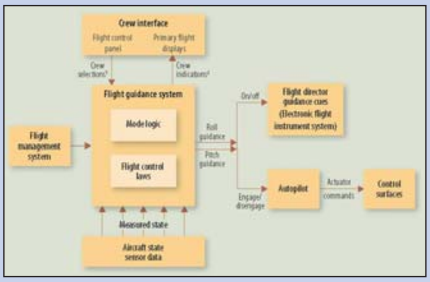

Figure 1: Flight Control System Automation Overview

Notes

1. *Button pressed and knobs set on flight control panel.*
2. *Indicator lamps illuminated/off on flight control panel and green/white textual mode annunciations on primary flight displays.*

Source: Langley Research Centre, U.S. National Aeronautics and Space Administration

Figure 2: Generic Flight Control Panel for Human Factors Research

ALT = Altitude hold mode/altitude selector; AP ENG = autopilot engage/disengage; CRS = course selector; FD = flight level change mode; HDG = heading select mode/heading selector; APPR = lateral approach mode; NAV = lateral navigation mode; VS = verticle speed mode – Source: Langley Research Centre, U.S. National Aeronautics and Space Administration

accident/incident data, and recommending and prioritizing best practices – possibly via a training aid – to enhance operational use of these systems.

Ten years ago, the Automation Subcommittee of the Human Factors Committee of the Air Transport Association of America (ATA) updated policy guidance for members on potential improvements in pilot training. The ATA said at the time, "We believe that action is required in the near term by carriers or their pilots to prevent commonly occurring [mode] errors."[4]

More recent incentives to sustain industry attention to mode awareness/confusion include an international initiative to replace nonprecision approaches with "precision-like" approaches that take full advantage of the existing flight guidance systems in airline fleets, RNP RNAV operation and global navigation satellite systems in areas of the world that lack modern infrastructure and precision approach guidance (ASW, 9/07, p. 20).

The *Global Aviation Safety Roadmap* (ASW, 1/07, p. 28) also envisions wider use of autoflight technology. The plan encourages airlines to implement use of a flight path target–flight path director or vertical modes of the autopilot, flight director and flight management system, or both, to reduce the risk of approach-and-landing accidents. These efforts may have to overcome existing automation policies prohibiting pilots from using some flight guidance system modes and/or requiring them to use other modes.[5]

Latest Pilot Reports

The captain of a Boeing 757, in a February 2007 report to the U.S. National Aeronautics and Space Administration (NASA) Aviation Safety Reporting System (ASRS), said, "Upon receiving approach clearance [at 10,000 ft on radar vectors], the first officer [as pilot flying] selected 6,100 ft … on the airplane mode control panel [manufacturers use different terms, including flight control panel (Figure 2)], and flight level change [as] the descent mode. Flight level change [mode] provided no protection for subsequent altitude restrictions on the approach. I was verifying the flight management system programming and ascertaining the aircraft position relative to ATANE intersection (minimum crossing altitude 10,000 ft MSL) as we began our descent. The aircraft was at approximately 9,400 ft slightly outside ATANE when I directed the first officer to pull up."[6]

The captain of a McDonnell Douglas DC-9 in February 2007 reported, "After leveling at Flight Level 340 [approximately 34,000 ft], my first officer (the pilot flying)… wiped his fingers, the throttles and the autopilot [mode] control panel with a wet wipe [and] inadvertently knocked the autopilot out of the altitude hold mode and into climb mode. We did not immediately notice the slow climb because of continuous light turbulence. When the altitude alerter [activated] at 34,250 ft, the first officer disconnected the autopilot and descended back to Flight Level 340. The altitude deviation was probably about 300 ft [in reduced vertical separation minimum airspace when ATC contacted the crew]."[7]

The captain of a 737-700 in December 2007 reported, "[As pilot flying, I] had the aircraft in heading select and vertical speed modes. In the turn [to 325 degrees], passing through approximately 300 degrees, we encountered moderate wake turbulence from a preceding aircraft. We did not recognize at the time that the flight director roll mode changed to control wheel steering mode from heading select mode after encountering the wake… Neither of us recognized that the aircraft went past the assigned heading in control wheel steering mode until air traffic control issued a corrective heading and advised 'no delay' on our climb through Flight Level 260 for traffic. Total course deviation was about 70 degrees."[8]

Flight Following

The *Flight Deck Automation Issues* Web site <www.flightdeckautomation.com>, funded by the FAA and operated by a contractor for safety research by the public, has accumulated evidence of mode awareness/confusion while tracking 94 human factors issues in flight deck automation. Two of the most relevant issues tracked regarding mode awareness/confusion are "mode awareness may be lacking" and "mode selection may be incorrect."

According to the Web site, the most compelling evidence that *inadequate mode awareness* can have fatal/severe consequences is the accident investigation report from a 1992 Airbus A320 accident in France and the 1995 report of a flight simulator experiment in which 11 of 12 pilots deviated significantly from the intended flight path after researchers induced uncommanded vertical mode changes, even though each mode change was annunciated normally. The A320 accident report noted that "the abnormally high rate of descent was the result of an unintentional command on the part of the crew because they believed the vertical mode selected on the autopilot to be other than that which was actually selected," the Web site said

The strongest example of *incorrect mode selection* cited by the Web site is the accident investigation report from the 1979 DC-10 inadvertent stall accident over Luxembourg. The U.S. National Transportation Safety Board's accident report said, "When the captain selected 320 kt into the autothrust system speed window, he may have either intentionally or unintentionally pulled the autothrust system speed selector knob. The action would have changed the autothrust selection from the N1 mode to the airspeed mode. This in turn would have caused the autopilot IAS [indicated airspeed] HOLD mode to disengage and revert automatically to the vertical speed mode of operation. …The autopilot commanded an increasing angle-of-attack while attempting to maintain a preselected vertical speed, which exceeded the limit thrust performance capability of the aircraft at higher altitudes."[9]

Airworthiness Standards

In May 2006, an amendment to U.S. Federal Aviation Regulations (FARs) Part 25.1329, *Flight Guidance System* – the first amendment since 1964 — became effective. The European Aviation Safety Agency and the FAA harmonized these regulations. In the course of rule making for these FARs in 2004, the FAA said, "Studies have shown that lack of sufficient flight crew awareness of modes, transitions and reversions is a significant safety vulnerability… Newer designs enable functions that were not possible for automated systems when the regulations were adopted… The newer designs also tend to be more complex from the crew's perspective, and vulnerable to flight crew confusion over mode behaviour and transitions."[10]

During design, manufacturers are now asked to consider specific past sources of mode awareness/confusion: Pilots have confused knobs for setting the airspeed command reference target versus the heading target on the mode control panel because knobs were not differentiated by shape and position; erroneous entries of targets have been made by pilots operating a single switch, such as a concentric rotary switch, to select diverse categories of targets; misinterpretation has resulted from inconsistent arrangement of the mode control panel, compared with the arrangement of flight mode annunciations on the primary flight display (Figure 3, p. 34); pilots have mixed up the autopilot and autothrust controls; and pilots inadvertently have changed flight modes because of the light control force required to operate a switch.

In FAA Advisory Circular 25.1329B, *Approval of Flight Guidance Systems*, special attention has been given to operationally relevant mode changes. The FAA said, "Annunciation of sustained speed protection should be clear and distinct to ensure flight crew awareness. …The transition from an armed mode to an engaged mode should provide an additional attention-getting feature, such as boxing and flashing on an electronic display… for a suitable, but brief, period (for example, 10 seconds) to assist in flight crew awareness."

Aural alerts may be warranted when, for example, the autopilot holds a sustained lateral control command or pitch command to compensate for an unusual operating condition, or the airplane nears the limits of the autopilot design in the pitch axis, roll axis or the amount of trim applied unintentionally in either axis. The advisory circular, and some human factors specialists, refer to such alerts as *bark before bite*.

"A timely alert enables the pilot to manually disengage the autopilot and take control of the airplane prior to an automatic disengagement caused, for example, by a lateral condition such as asymmetric lift and/or drag caused by airframe icing, fuel imbalance or asymmetric thrust," according to the AC.

Solutions at Hand

CAST worked earlier in this decade with air carriers and manufacturers on the mode awareness/confusion issue to generate safety enhancements as a "short-term tactical solution" for reducing the risk of loss of control. CAST safety enhancements appear in a February 2003 report by the CAST Joint Safety Implementation Team.[11] One example is no. 36, which says, "Developspecific guidelines for eliminating mode confusion. Implement guidelines on new [airplane] type designs and study the feasibility of implementing guidelines on existing type designs. Implement changes per the feasibility study. … To avoid problems due to unexpected mode changes, automated flight system logic should be designed to be error-tolerant or, at a minimum, provide an alert when the desired mode is in conflict with aircraft energy state. …To ensure flight crews have a comprehensive knowledge of the automation system(s) functional operation, airlines/operators should ensure that their training/standardization programs emphasize these skills."

The ATA's key recommendation was that pilots deliberately scan the flight mode annunciations to determine whether autopilot and/or autothrust are engaged and in what modes – not merely to confirm the result of each autoflight mode selection considering that so many mode changes are

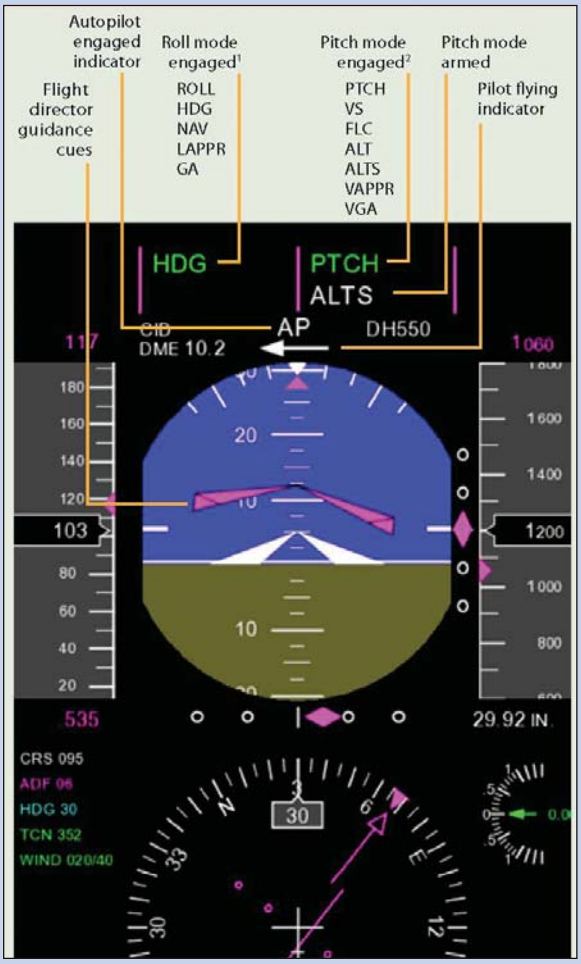

Figure 3: Generic Primary Flight Display for Human Factors Research

ALT = Altitude hold mode; ALTS = altitude select mode; FLC = flight level change mode; GA = lateral go-around mode; HDG = heading select mode; LAPPR = lateral approach mode; NAV = lateral navigation mode; PTCH = pitch hold mode, ROLL = roll hold mode; VAPPR = verticle approach mode; VAG = verticle go-around mode; VS = verticle speed mode

1. *One engaged roll mode and one engaged pitch mode appear in green on the first line.*
2. *One armed roll mode and one armed pitch mode appear in white on the second line.*
3. *Autothrust modes typically annunciated on the primary flight display were not included in this example*

Source: Langley Research Centre, U.S. National Aeronautics and Space Administration designed to happen without pilot action. Another suggested countermeasure was collecting and analyzing all mode awareness/confusion events, etc. through a pilot voluntary reporting system and, if required, proactively "changing the expectation" of pilots by highlighting the identified issues in training.

Mode awareness/confusion also has been addressed by the Flight Safety Foundation *Approach-and-Landing Accident Reduction Tool Kit*. Examples of the tool kit's recommended countermeasures are checking that the knob or push-button is correct for the desired function before each mode/target selection, monitoring the flight mode annunciation and calling out all mode changes in accordance with standard operating procedures, and cross-checking the altitude entered on the mode control panel with the selected altitude shown on the primary flight display.

The 2004 revision of the *Airplane Upset Recovery Training Aid* also contains relevant information.[12] An FSF safety seminar presentation by Boeing in October 2007 highlighted this training aid and cited several pilot-induced errors involving maneuvering at high altitude in a mode that does not protect against thrust and buffet margins.

"When using LNAV [lateral navigation] mode during cruise, the mode provides realtime bank angle-limiting functions and will keep the commanded bank angle from exceeding the currently available thrust limit," Boeing said. "This protection is not available when LNAV mode is deactivated. Heading select mode does not protect against too much bank. And often when maneuvering around storms… crews have left the bank angle setting at something used during low-altitude operations… A common technique [in threat and error management] is to set the mode control panel bank-angle selector to 10 degrees when at cruise."[13]

On the Drawing Board

The focus of a team from the NASA Langley Research Center and Rockwell Collins reflected one of the major research directions: in-depth human feedback for qualitative insights combined with exhaustive mathematical probing of flight guidance system models by other software for quantitative validations of mode logic and behaviour. In the late 1990s, this team created its first software model of a flight guidance system, connected it to a desktop computer simulation of a flight deck and reviewed the mode behaviour and human-machine interface with avionics design engineers, pilots and human factors specialists.

Their second strategy applied software engineering, specifically two formal analysis methods in which outputs of mathematical formulas change in response to inputs of different variables, called *model checking and theorem proving*. This strategy enabled softwarebased "exploration" of all possible scenarios and combinations of modes – how, for example, some pilot inputs are ignored as irrelevant by the active mode logic. These researchers said in 2003, "Even though our [formal analysis of a simplified model of a regional jet flight guidance system] was only partial, we were able to find hidden modes, ignored operator inputs, unintended side effects, lack of feedback regarding current modes, and surprises in how off-normal modes can be entered and exited in our example specification."[14]

As one example of related activities by airframe manufacturers, Boeing has been communicating through FSF safety seminars and aviation humancomputer interface conferences its efforts to rethink flight guidance system design, test prototypes and provide supplemental educational modules in support of deeper pilot understanding of existing automation behaviour.

A clean-slate design for a future flight guidance system has been presented at industry conferences. One Boeing presentation, for example, said that this new design has discarded the concept of pilots memorizing rules for each mode – a limitation imposed decades ago by the avionics architecture itself – with "indications directly related to flight path behaviour (e.g., CLIMB, LEFT TURN)."

By starting from scratch, the designers gained the opportunity to make each automated method of flight conceptually correspond with the manual method used by pilots; make infrequent tasks as simple as common tasks; clarify when flight is linked/unlinked to strategic targets in the flight management system or tactical targets entered on the mode control panel; and provide a "preview line" for tactical target entries. They said, "In the new design, approach, landing, go-around and even taxi guidance use the same modes and interfaces as up-and-away flight, resulting in only seven modes to cover the entire domain and providing an extreme level of simplicity and consistency."

Notes

1. *Joshi, Anjali; Miller, Steven P.; Heimdahl, Mats P.E. "Mode Confusion Analysis of a Flight Guidance System Using Formal Methods." In proceedings of the 22nd Digital Avionics Systems Conference in Indianapolis, Indiana, U.S., October 2003.*
2. *Boorman, Daniel J.; Mumaw, Randall J. "A New Autoflight/FMS Interface: Guiding Design Principles." Paper presented to the 2004 International Conference on Human-Computer Interaction in Aeronautics in Toulouse, France, September 2004.*
3. *FAA Human Factors Team. "The Interfaces Between Flightcrews and Modern Flight Deck Systems." June 18, 1996. Reprinted by Flight Safety Foundation in the October 1996 Flight Safety Digest.*
4. *ATA Automation Subcommittee, Human Factors Committee. "Potential Knowledge, Policy or Training Gaps Regarding Operation of FMS-Generation Aircraft – Second Report." June 1998.*
5. *Sherman, P.J.; Helmreich, R.L.; Merritt, A. "National Culture and Flight Deck Automation: Results of a Multination Survey." International Journal of Aviation Psychology Volume 7/4, 1997. Cited on <www.flightdeckautomation.com>.*
6. *NASA ASRS report no. 728889, February 2007.*
7. *NASA ASRS report no. 726182, February 2007.*
8. *NASA ASRS report no. 767601, December 2007.*
9. *NTSB. Aeromexico DC-10 Over Luxembourg, November 11, 1979. Aircraft Accident Report no. NTSB/AAR-80-10, 1980. Cited on <www.flightdeckautomation.com>.*
10. *FAA. "Safety Standards for Flight Guidance Systems." Notice of proposed rule making no. 04-11. Aug. 13, 2004.*
11. *CAST. "Loss of Control (LOC) Joint Safety Implementation Team Report." Feb. 15, 2003.*
12. *Upset Recovery Industry Team. Airplane Upset Recovery Training Aid, Revision 1. Aug. 6, 2004.*
13. *Carbaugh, Dave. "Threat and Error Management (TEM) and High Altitude Operations." Presentation to the Flight Safety Foundation International Air Safety Seminar in Seoul, Korea. October 2007.*
14. *Joshi et al.*

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EU Carrier Blacklist: Asian Update

by Keith Richardson, Partner BLG LL

On 14 November 2008, the EU Commission issued regulation (EC) No. 1131/2008 which is the ninth amendment to the EU carrier 'blacklist' (regulation (EC) No. 474/2006). In this article Keith Richardson, a partner in our Singapore office, examines the latest amendment to the so called EU carrier 'blacklist' with reference to three Asian countries: the Republic of the Philippines, the Kingdom of Cambodia, and Indonesia.

The Republic of the Philippines

On 13 October 2008, the Philippine authorities presented to the EU Commission details of an ongoing corrective action plan to redress previously identified safety deficiencies. The Philippines seek to complete the action plan goals by March 2009. The Commission has confirmed an intention to carry out, with the assistance of member states, a safety assessment early in 2009, to verify implementation of the action plan.

Meanwhile, the International Civil Aviation Authority (ICAO) had scheduled a comprehensive inspection of the Philippines for November 2008, within the framework of its Universal Safety Oversight Audit Program (USOAP). However, the Philippine authorities have asked ICAO to delay its inspection until October 2009 to allow time for safety deficiencies identified by the EU Commission to be addressed.

The Philippines is also the focus of monitoring by the US Federal Aviation Administration (FAA). During 2008, the FAA lowered its own safety rating of the Philippines under its International Aviation Safety Assessment Programme (IASA). Following a finding that the Philippines had failed to comply with international safety standards set by ICAO, carriers from the Philippines may only continue their US operations under heightened FAA surveillance and any expansion or change in services to the US is not permitted.

The Kingdom of Cambodia

With the latest update, the Commission has imposed an operating ban on the main carrier from Cambodia, Siem Reap Airways International. This step was taken following evidence that the operator does not comply with Cambodian civil aviation regulations and does not meet ICAO requirements.

The threat remains of all carriers licensed in Cambodia being included in the next EU blacklist. The amending regulation notes that there is "verified evidence" of what it describes as "insufficient ability of the authorities responsible for oversight of air carriers certified in Cambodia to address safety deficiencies". Regulation (EC) No.1131/2008 goes on to cite the outcome of ICAO's USOAP audit of November and December 2007 which reported a large number of non-compliances with international standards and the existence of significant safety concerns regarding the capability of the civil aviation authorities of Cambodia to perform their air safety oversight responsibilities.

Consultation has been ongoing between the EU Commission and Cambodia regarding the measures which can be implemented to address the deficiencies cited by ICAO. One measure is the establishment of an aircraft register and the de-registration of a significant part of the Cambodian fleet. The register came into force in November 2008. Also in November 2008, the Cambodian State Secretariat Of Civil Aviation issued a progress report subsequent to ICAO's 2007 USAOP which sets out additional ongoing corrective actions measures.

Indonesia

During 2008, both the Indonesian authorities and individual carriers such as Garuda Indonesia made representations to the EU Commission to try to have Indonesian certificated carriers removed from the EU blacklist. However, these representations failed to demonstrate to the EU Commission's satisfaction that the Indonesian authorities had the ability to ensure oversight of the carriers they certify, in particular in relation to flight operations surveillance. In the earlier July 2008 amending regulation, the EU Commission acknowledged that the Indonesian authorities have deployed considerable efforts to redress the safety situation and are beginning to implement a series of comprehensive corrective actions. However, ICAO has not agreed to the closure of its safety findings raised during its audits of November 2000, April 2004, and February 2007 and, until these are addressed, significant concerns will remain.

Because of these ongoing issues, the EU Commission has again declined to remove any of the Indonesian carriers from the blacklist.

UK Flight Safety Committee Benefits of Membership

Safety Information Exchange Meeting

We hold six Safety Information Exchange meetings each year which are attended by 60-70 of the Membership each time. These consist of detailed exchanges on incidents and accidents and other aviation safety concerns between 89 UK and International airlines and airline service providers. This is conducted under a confidentiality agreement which is part of the conditions of Membership.

Regular contributions are also made by representatives from the CAA, AAIB, CHIRP, UK Airprox Board, GASCo, BALPA, NATS, BAA, and the UK Met Office.

We also include topical and relevant presentations by experts on various aspects of aviation safety from every perspective. For example, Airbus recently gave detailed accounts of the Perpignan and Hudson River accidents.

The proceedings are recorded in detail and are made available to those who had been unable to attend through a secure Membership area on our website. An Executive Summary of the major learning points from each meeting, appropriately de-identified, is also produced for quick and easy distribution to Accountable Managers, Flight Operations, Training and Engineering Departments within each Member Company.

This is also a great opportunity to network with commercial aviation players across the industry – passenger and cargo airlines of all sizes, Helicopter Operators, Airport Operators, Aircraft and System Manufacturers, Insurers, Claims, FDM and SMS software people, Chart Producers, Maintenance, Engineering and the Learned Societies. Take a look at the Members page on the Website. We have contacts in most areas of expertise who are very willing to advise on all aspects of aviation safety.

Access to National and International Aviation Safety Forums

The Chief Executive of the UKFSC is a member of over 20 national and international aviation safety forums and committees in EASA, CAA, DfT, FSF, Eurocontrol, CHIRP, NATS, BAA, Manchester Airport, GAPAN and GASCo. The UKFSC has also recently taken over the Overseas Facilities Working Group Business which addresses safety issues encountered by Member airlines overseas. The Chief Executive also attends relevant conferences such as the International and European Aviation Safety Seminars and the European Society of Air Safety Investigators Seminars. The External Meetings page on the UKFSC Website demonstrates the extent of our involvement.

A Summary for every meeting and seminar, complete with links to other relevant information, is posted on the UKFSC Website under External Meetings in order to keep Members informed on the aviation safety issues being discussed. In addition, these meetings and seminars also provide an excellent opportunity for the UKFSC to heighten awareness and influence outcomes and solutions to areas of concern identified by UKFSC Members.

In addition to an involvement with UK and European aviation safety organisations, the UKFSC has contacts with several international safety forums in Africa, the USA, the Middle East and Australia.

UK Flight Safety Committee Website

As well as providing the objectives, history, membership and constitution of the UK Flight Safety Committee, the newly developed UKFSC Website now contains a great deal of new information on all aspects of aviation safety. For example, a compilation of the most highly regarded academic and practical advice available on Safety Management Systems, Hazard Identification and Risk Management.

The latest EASA, CAA, Eurocontrol and NATS consultations, notifications and Safety Alerts are also listed or links to the source website provided. Topical and relevant Safety Presentations and Briefings on all aspects of aviation safety gained from numerous seminars, conferences, courses and committee meetings are readily available for Members.

Beyond our own dedicated UKFSC Website, we are also a partner in the development of the SKYbrary website at www.skybrary.aero/landingpage. The aim of SKYbrary partners is to establish a single point of reference for aviation safety knowledge.

Finally, a weekly email is sent to all UKFSC Members which highlights the latest additions to the Website.

FOCUS On Commercial Aviation Safety Magazine

The UKFSC publishes a quarterly aviation safety magazine on commercial aviation safety called FOCUS. It has a global circulation of 10,000, and potential readership of 20,000. Individual Subscribers pay £16 per year plus postage, but Members get it free – and you can have as many copies as you like, within reason.

Recent editions have included articles on level busts and TCAS, wake turbulence, braking on contaminated runways and ATC communication problems, Safety Management Systems and Threat and Error Management.

Past copies of articles and features from the past 12 years of FOCUS are now available in PDF format on the Website. A breakdown of article topic and content is also available to make selection more easily achievable.

Flight Safety Familiarisation Courses

We run 3 day Flight Safety Officer Familiarisation Courses which are free to Members – these are generally well regarded and very popular. The course is aimed at providing the basic knowledge required by Flight Safety Officer but it offers invaluable information for the novice through to the experienced aviator or engineer. Specific details of the course syllabus are available on the UKFSC Website. Non-UKFSC Members may also attend for a modest investment, which can be reimbursed should the attendee wish to subsequently join the UKFSC as a result of what has been learnt on the course.

If you are interested in joining the UK Flight Safety Committee visit the Membership page of our website or call the UKFSC Secretariat at Fairoaks Airport on +44 (0)1276 855193.

Rich Jones – Chief Executive
UK Flight Safety Committee
March 2009

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