Keynote Speech for Fire & Cabin Safety Research Conference

Introduction

Good afternoon! I am delighted to be here in Atlantic City to take part in this conference on Fire & Cabin Safety Research. This is an important area for safety. As you have heard I am not a specialist in these subjects, so I have thought about what I can say that will be relevant, and so I plan to give some views from my own perspective on this subject area, plus talk a little about how regulation is changing over in Europe, and then spend some time discussing the safety risks and what we should be doing in the future in terms of the research issues for fire and cabin safety.

A Strategic Analysis View: Fire & Cabin Safety are Important

My job in the UK CAA is Head of Research & Strategic Analysis, and the Strategic Analysis part supplies the data that helps the organisation decide what areas we should invest in, in terms of research and also other safety initiatives. This process starts with analysis of what is killing people in commercial aviation today. For every year since 1980, we have an analysis of fatal accidents to large public transport aeroplanes world-wide, including causal factors, circumstantial factors and consequences, such as CFIT, Loss of Control or Post Crash Fire. This gives us the main accident types that we should focus on, then we may customise (more usually add to) that by studying High Risk Events to UK aeroplanes. That might give us an additional risk, for example mid air collision is not very apparent in the world-wide statistics but the UK has very crowded and complex airspace, so perhaps it is more of a risk for us. Once we have our list of main risks, we drill down into our Air Safety Reports (or rather Mandatory Occurrence Reports in the UK) to find out how many events we have recorded that could be precursors of those main risks that we have identified.

Anyway we have just finished the fatal accidents analysis for 2006. We recorded 31 fatal accidents to public transport aeroplanes world-wide and of those, we know at least 12 ended in post crash fires. In at least 4 cases, the fire was the cause of fatality. I say ‘at least’ because we only can record the information as we receive it, and in some cases where there is total loss there can be a fire but it isn’t always mentioned in the brief report that we get. In the last ten years there have been 121 fatal accidents with post crash fires, so it is not just that 2006 was different. That is interesting because other aspects of the analysis have changed substantially in the last ten years, in the kind of accidents that we generally see, yet fire remains constant. In an industry where an accident is extremely rare, that does show that fire is still one of our greatest risks. So, there is no question that this remains a leading area of interest for safety improvements.

A Human Factors View

My background has been mainly in flight deck design involving crew related human factors and in fact most areas of safety improvement now are focused on solving the human issues since these seem to be the main factor in events. It was a bit of a surprise to me, coming in to fire research fairly recently that there still needs to be a very strong emphasis on the technology aspects of fire management. There are a

number of ways to interpret that. I know that fire related research does have some tough technical challenges to solve, and perhaps that is the reason. It could also be a sign that fire safety research has not had the resources that have been applied to other areas. It could also be a symptom that fire and cabin safety research is a little prone to staying in 'silos', with the work connected with the aircraft fire fighting and the evacuation being kept rather separate from the work on fire fighting and passenger management from the airports point of view. I say that could be a symptom because very often the human factor type issues arise from trying to integrate various parties or disciplines together and they become highlighted when that integration is attempted. It slightly concerns me that there is the apparent gap between the research community who manage the aircraft systems fire issues and those who have to cope on the ground when everything has gone wrong – the airport fire management specialists. One piece of evidence in that thinking is that we are here in Atlantic City and the Fire fighters had their conference a couple of weeks ago in Singapore. In human factors terms I can see some elements of tribalism there and one possibility for the future would be to encourage specialists to step outside their comfort zones, to see the bigger picture and to try to develop integrated solutions to safety problems. If I can give you an example of what we're doing in the UK in this area, we're looking at treating emergency evacuation as a more holistic process, considering passenger evacuation not just to outside the aircraft but to a safe area with new technology, working with airport fire fighters.

Regulatory Change in Europe (Keyword - Change)

I am told that people in the US might be interested to hear what is happening in Europe in terms of Regulation. Well, what has been happening in Europe in aviation safety regulation could largely be summarised by the word 'Change', and that will continue for some time to come. The new European Aviation Safety Agency (EASA) was officially born in 2003 and has been gradually taking on responsibilities, some in the way that was expected, and some not quite as expected. In a previous life I worked for the military and they used to say that no battle-plan survives first contact, and so it has been with EASA, we have been learning as we go along. At one time it was envisaged that EASA would really take over most of the functions of the national authorities, but as time has gone on it has become apparent that there is a continuing role for the NAAs and the shape of that will no doubt continue to evolve. The present view is that EASA will lead on research connected with rulemaking but that other national authorities are expected to continue with some research for the medium term. Much of our research in the UK now is aimed at better regulatory oversight, guidance material, means of compliance, and better monitoring of safety margins in the UK fleet. It's worth making the point that the CAA is still responsible for the safety of aviation in the UK. It may develop into a model that is quite different from the past and will almost certainly affect how we participate in international collaboration.

Effects of Change (makes us fundamentally review what we should be doing)

Something that happens at a time of great change is that it causes us to stand back and take stock of our basic roles and responsibilities, what is really important, what are the risks, what resources we really need, and for what reason. We start to consider what we can and cannot do without in a much more fundamental way than we normally would do and really allow ourselves to think the unthinkable in challenging our very

existence. It is not particularly comfortable, but perhaps it is healthy to be shaken up and forced into that kind of reflection once in a while, although I hope it doesn't happen too often. But it does focus ones mind on what are the real demands upon us today, and tomorrow, and where should we put our efforts and why? What are the risks – safety risks, organisational risks, economic risks. When we are really being challenged like this, it also makes us look for the evidence to help us decide our direction, and once we have decided, we will need it to support our case. Nothing is a foregone conclusion any more – not even our continued existence, and that can tend to focus the mind. So what are the questions that we have been asking ourselves, and is there anything that can be generally useful from them? I thought perhaps it would be worth sharing with you some of that thought process, not to try to give you definitive answers, but to perhaps provoke more debate of the questions, because they are questions that must be in some ways relevant to everyone involved in this field.

Should we be spending resources on Research at all? (How is it cost effective)

Times of change like this are particularly tough for research – two reasons. One is that when an organisation is in turbulence, people under pressure can tend to focus on short term priorities and "Research Budget" as a line item can look like a very big number that is not going to make much difference to the outcome in the near future, especially when compared to travel expenses and stationary budgets and the other things that managers are accustomed to seeing. The other is that when responsibilities are shifting between parties and there are various mutual expectations that may or may not be realistic it is difficult to get any long term stability which is what you need to organise the finance and practical arrangements for a research programme. In the UK this is particularly interesting because we receive no money from government, we are entirely funded by the aviation industry and the industry do not want to pay twice, once to a European Agency that has promised to deliver and again to their national CAA, and they have been pretty clear about that. Research is expensive – a single project costing $100,000 would be considered relatively small. So that has caused a little thought about whether the money we spend on research is really worth it.

I am told that here in the US, in-flight fire causes an average of one diversion per day. I have found that a great many people who work for airlines have really not much idea about their own operating costs. Pilots, even Operations managers, often think of the cost of a diversion as being only the cost of the fuel. They don't include in their considerations the cost of the sub-leased aircraft to replace the one that has diverted,; nor entire flight and cabin crew that now have to be paid an additional duty and transported out to the original destination to fly it and the cost of the 300 passengers hotel bill or the additional landing fee and so on. It can quickly exceed $250,000 per diversion. Suddenly a research project to provide new information to the whole industry that could reduce the fire risk and therefore the number of diversions for years to come seems like quite a good cost-benefit. An item of research equipment that costs $100,000 will last for several projects for widespread benefit and the cost is equivalent to one FMGS keypad for a commercial flight simulator. If there were a high profile event and pictures of a burning aeroplane on the tarmac were on TV, with loss of life and severely burned passengers, there will be a loss of public confidence in that airline or even in flying generally. If that airline had to reduce their fares to entice the flying public back into their seats, or to change their name in a re-branding exercise the cost could be astronomical. In addition to those more obvious costs there

is also the view that having supported research shows that you are doing all that you can to avoid certain risks, and that alone may eventually pay for itself tenfold in these litigatious times. So we need to encourage the transparency of costs so that people making the decisions are clear about what it is they are deciding.

Why Research into Fire & Cabin Safety (is it really still a Risk?)

There has already been a great deal of research into Fire and Cabin Safety. Granted, there have been huge gains, in our knowledge of evacuations, flammability, fire suppression and so on. The A340 accident at Toronto that could have proved so tragic was evacuated without a single fatality. Haven't we solved it all by now?

There are a couple of problems with that argument. For a start, we don't live in a static world where, once a problem has been solved, it stays solved. We have change all around us; bigger, double deck aircraft with unprecedented numbers of passengers, a new pressurised composite hull and increasingly complex in-flight entertainment systems, various installed technologies ageing and cleaning and maintenance regimes being brought under cost scrutiny. That's just the aeroplane; There are the new low-cost operators, there are new fire fighting media, different passenger groups – older, less mobile people are travelling more, and travelling in groups, there are new security regulations to restrict the kind of implement that can be carried on board to access hidden areas. The strong environmental lobby is making us think more carefully about the effects of our activities at airport and that could be the subject of systematic research to assess where we are and what we can and cannot do to reduce environmental impact without impacting safety; all kinds of changes.

Then there is the temptation to colour our judgement with the most recent event and that is a very normal human thing to do, especially when events are rare, dramatic and happen close to home. But I think there is a need for us to grow up a bit in terms of our risk perception and be more systematic and proactive in assessing our risks and not so easily swayed by single examples that are bound by their nature to be unique and shaped by chance circumstances and thus not entirely representative of the whole situation. Our views could be coloured by the A340 at Toronto where over 300 people were safety evacuated and then an event such as the B737 in Indonesia last March, where 21 people died, might occur the day after we decide to cut the budget. Is there any good reason why the events in Indonesia could not have happened in Toronto instead, or for that matter London, New York or anywhere? All of us in this room know that Research takes time and cannot be turned on and off in a knee-jerk reaction to random events, trying to reactively solve the accident that just happened that statistically now won't happen again in fifty years. Research needs to be planned systematically and started way ahead of the problems if a solution is to be delivered in time to be any use. We need to get smarter about how we use data to depict risk to the people who make decisions about our funding and general resource, but even that isn't quite as simple as we would like it to be.

I mentioned earlier that our analysis of fatal accidents world-wide indicates that fire and cabin safety is one of the leading priorities. Its hard to say how many of those fatalities would have survived the accident unless there had been fire or evacuation difficulties but Ray Cherry who will be talking later will talk about what has been done in this area. We also drill down into lower level occurrences to see if we can

identify precursors to those events to give us some indication of the risk in the UK fleet. Our lower level occurrences come from a system called Mandatory Occurrence Reports (MORs) that anyone in our aviation industry is obliged to report to us any event that they think posed a hazard to flight safety, or would have done if uncorrected. We receive around 12,000 reports per year, and it's a good source of data, easier to access on some subjects than others. Post crash fire is tricky of course, because the necessary precursor is a crash, and mercifully that is pretty rare. For in flight fires, we receive around 300 reports per year, although fortunately a somewhat reduced actual number of fires once the more detailed analysis has been undertaken.

The difficult part is to say how much of a risk there is and how to compare that and prioritise it when comparing it with other risks. There is sometimes a tendency for people to fixate on which way the graph is trending at any particular time. If it is going up, numbers of events are increasing, it gets highlighted as a risk and if it is static or trending down, it attracts less attention, the risk is in hand. I don't think that is the whole picture. I don't even think numbers of events or rate of events per flight hour really tells us the risk. For example if there were 100 galley fires per month and it was getting a little higher each year, and 30 fires per month in the wiring in hidden inaccessible areas, and that were getting a little lower each year, I would still be more worried by the hidden fires than the galley fires, even despite the lower number and reducing trend. That is because I think you can have more galley fires before one develops into a serious situation than would be the case for hidden fires. I am not saying that is how many fires there are, but it's a hypothetical example. We need to start getting to grips with those ratios, and trying to build a picture of how many of each type of event occur compared with how many develop into a serious threat, in order to help us assess where the real risks are. That might help us to compare say fire risk against other flight safety issues such as icing events, loading errors, loss of separation. I think there is opportunity for much better use of data to decide which risks to address and in fact fire and cabin safety lend themselves to that quite well because the data is much clearer than in some areas.

What to do and how to do it?

We have talked about data and how important that is to monitor risk areas, and that will to some extent generate the content of projects. Yet even with all that data, it still doesn't address the risks from new technology or changing circumstances, which would need a proactive programme of risk identification.

We are very fortunate in this particular subject area because we have the international Fire & Cabin Safety Research Technical Group which has been highly successful in achieving a high level of international co-ordination and continues to be fully functional despite being surrounded by change. And of course, who have organised this event!

One of the marked differences between the way we do things in the US and Europe is that the US has some of these wonderful established facilities, like the FAA Technical Centre here in Atlantic City, that produces high levels of expertise and infrastructure although does to some extent mean that there is a continuous need for financial support. In Europe, we generally take the approach of deciding what it is exactly we want to do and then looking for someone to do it, which allows us to be ultimately

flexible but frequently restricts us because the right level of expertise and infrastructure simply may not exist, and it cannot be spirited up overnight. So there are advantages and disadvantages. In these times of great change, you might think that the flexibility would be the higher priority, but I am not so sure about that either. Enduring infrastructure can be surprisingly flexible if it chooses to be and is willing to adapt and reinvent itself perhaps with occasional expertise brought in to supplement the existing system when the need arises. I would hope that Europe will, in due course, be looking to support improved safety research infrastructure. Returning to what I mentioned earlier about human factors and tribalism, the utopian facility in my mind would include all disciplines and perspectives involved in addressing a particular issue such as fire, and perhaps that is a thought we can use in developing our research thinking in the future.

We have to be pragmatic about what can actually make a difference to improve fire safety. One of the things that CAA is doing currently is some human factors research to support the people at the front line of fire defence, the cabin crew and the CAA has launched a complete review of cabin crew fire training. We want to be sure that current and future training is appropriate and although this is a UK funded study, our perspective is very international and we welcome participation – there's an interactive website and I believe there are leaflets at Registration, so please do pick one up and contribute your expertise.

Conclusion

In conclusion, Fire is a threat. In a vessel that is full of wiring, maybe ageing wiring, that might have lint and dust around it, that is full of fuel, carrying goods that may not be visible to inspection and might cause ignition, and is maybe a long way from anywhere that passengers can disembark safely, in a constantly changing world, it is hard to say there is nothing more to do. And the data supports that. It certainly gets my vote as a subject that deserves attention, and that is not just hot air, it is something that we actively pursue, so I am looking forward to hearing your work on this important subject and continuing to support it for the years to come.