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(Presented in Atlantic City by Frank Taylor, member of ETSC's Air Safety Working Party)

I am grateful to the FAA, Transport Canada, the JAA and the Civil Aviation Bureau of Japan for the opportunity to give a perspective from the European Transport Safety Council (ETSC) on aircraft cabin safety.

Introducing ETSC

To start with a word about ETSC. We are a Brussels-based non-governmental organisation partly funded by the European Commission to provide a source of impartial advice on transport safety matters in Europe. Since we formed in 1993, ETSC has been trying to establish the different dimensions of the transport casualty problem for the EU as a whole, the socio-economic cost for EU citizens, and identifying and actively promoting research-based countermeasures with due consideration to public acceptability and cost.

ETSC currently brings together 25 international and national organisations and, in 12 working parties covering all the transport modes, a large network of independent transport safety experts from the leading research organisations in Europe. Membership includes:

- International organisations with safety interests
- National transport safety organisations
- National research and technical bodies
- National transport user organisations
- Insurance organisations

Our membership also includes European Parliamentarians because we believe that the interchange between professional and political expertise is a key factor in trying to encourage high levels of safety in the European harmonisation process. We have been particularly active since we formed in the car crash protection field, helping to ensure that world-leading new EU standards on front and side impact crash test procedures which came into effects for new car types last month offer the highest practicable level of protection.

Well aware of the importance of aircraft cabin fire and crash protection in air safety strategy, this was one of the first areas of study for ETSC with the aim of identifying the level of independent professional consensus about effective action and to highlight appropriate activity by the European Union.

Two years ago, we published a review on Increasing the survival rate in aircraft accidents prepared by our Air Safety Working Party and I would like to present some of our findings and recommendations which, looking back at the activity over the last two years, still seem to be current.

Why does aircraft cabin safety need to be improved ?

If you compare the risks associated with passenger travel in Europe measured by time spent travelling, which in our view is the best measure of exposure when comparing the different modes, air travel presents higher risks than ferry, train or even car travel. It is eighteen times more risky to spend time in the air than to go by train.

At least for the moment, people are spending more time travelling by other modes and the numbers of air accident deaths and the costs associated with them are relatively low.

However, this may change as exposure to risk of injury increases with the predicted doubling of air traffic over the next ten years and against a background of a fairly flat survival rate which has not been improving sufficiently fast to cope with many further demands on the system. However much crash preventative work we do to try and reduce errors occurring in air transport operations, crashes will continue to occur and as the size of aircraft increases, so does the need for action to mitigate crash consequences. While passenger safety has always been a high priority within the aviation industry, these developments demand a new burst of effort if a deterioration in safety levels is to be avoided.

It has been estimated that around 90 per cent of aircraft accidents and 40 per cent of those involving a fatality can be categorised as technically survivable. Rough estimates are that probably around 600 of the 1500 aircraft occupant deaths worldwide are in such accidents. Of these 600, around 330 die as a result of the impact and 270 due to the effects of smoke, toxic fumes, heat and resulting evacuation problems.

The need for a package of measures

Impact protection, fire protection and swift evacuation are clearly key fields of action needed to improve the survival rate in aircraft accidents. A package of survivability measures will need to cover several areas:

- Training crew & cabin staff to share critical information
- Improving crash protection & protective equipment
- Reducing the chance of fire, in particular, in the cabin
- Avoiding the development of toxic fumes & protecting against them
- Maximising the opportunities for orderly and fast evacuation
- Action to improve survivability of third parties.

There is little point, for example, focussing on impact protection alone if more people are then subjected to the subsequent hazards of fire and toxic smoke. All the different elements need to be addressed.

Ideally, the identification of such a package of countermeasures should take account of a number of different factors:

- casualty and injury reduction potential
- cost-effectiveness
- ease of implementation at new type/new aircraft/ and refit stages

In reality, the absence in many accident investigations of detailed information on injury mechanisms and cause of death makes it very difficult to arrive at a precise quantitative estimate of the potential benefits of any one measure. However, we did, on the basis of the Cherry Study - one of few to have performed a detailed examination of the full range of possible survivability measures and on the basis of other information, want to highlight various measures which would, no doubt, increase substantially the chance of surviving an accident.

The cost-effectiveness of these measures, of course, will depend on whether they are implemented at design stage of new aircraft types, where costs are minimal, whether they are applied to all new aircraft or whether introduced at refit stage, where the cost will be higher if the measures involve structural considerations.

It seems to me that we spend a lot of time debating the technical merit of measures, when the real issue of concern amongst those opposing their introduction, is not so much the effectiveness of the measures but how much they will cost.

ETSC would like to see the debate focussing much more on at what stage we can introduce measures to keep costs down. ETSC's main concern, is that, at least, we see the aircraft industry applying current knowledge to new designs, especially those which are going to be carrying substantially more people.

I would like to run through these recommendations without going into any detail to an audience such as yourselves who will, of course be well aware of their basis in research and accident analysis.

Impact protection measures

Around 55 per cent of the fatalities in technically survivable impacts occur as a result of the impact.

- The first and fundamental need is to improve seat floor strengths for take up in new aircraft designs. With floor failures seen frequently in air accident investigations, it's clear that current test procedures are not sufficiently representative of real world scenarios. Floor strength

standards need to be much tougher to improve the structural integrity of the cabin and also to give occupant restraints a chance to work.

- Apply three-point safety belts. Research indicates that we cannot rely on passengers to get the brace position right. Also, the way young children are currently restrained in aircraft is wholly inappropriate. Though at the moment few enough travel by air to make this a numerically large casualty problem compared with other occupant agegroups, the airline does have the responsibility for safe carriage and a international standard needs to be developed to allow provision of satsifactory restraints.

- Strengthen the overhead bins through dynamic testing and reduce luggage loads at the same time.

- Ensure that the immediate seating environment is 'forgiving' with no hazardous structures in the envelope surrounding the passenger.

In all these area, we need to be giving more attention to realistic test methods for design and validation work. The appropriate development work towards international standards should be carried out as soon as possible.

Fire protection measures

- Fit external camera/cockpit monitors - the crew's ability to monitor the exact situation outside the aircraft is critical.

- Introduce smoke hoods to protect against smoke and toxic fumes. In the past, it's been argued, and erroneously, in our view, that the onset of 'flashover' in crashes is so fast that there is insufficient evacuation time for smokehoods to be donned. However, accident analysis indicates that the 'flashover' phenomenon is not as common as the smoke-filled and toxic fume environment when life-threatening cabin fires occur. Here evacuation is actually hindered due to the incapacitation of occupants from the effects of smoke and fumes.

- Watermist systems. There was significant development in the 1980s, but little seems to have happened since 1993 when the UK Civil Aviation Authority estimated that water spray systems would save an average of just 14 lives globally. We believe that these figures considerably underestimate the potential and that the high costs cited in the analysis could be minimised if features were to be introduced at design stage. We would like to see the fitment of watermist systems on all new aircraft types.

- Introduce toxic emission standards on cabin materials. But there will be a limit to what can be achieved through improving cabin materials as long as passengers bring on plastic bags, newspapers and other articles which fall well short of standards appropriate for cabin furnishings and fittings. Fuel can also burn around the fuselage giving off irritant and toxic smoke.

- Increasing the survival rate in accidents does not only involve aircraft design and safety management but also involves the efficacy of ground-based rescue and firefighting facilities. As some 82 per cent of accidents occur during the take-off or approach and landing phases of the flight, the majority of accidents will be in or close to airports. Additional equipment and training needs to be provided for fire services operating close to airports and outside the airport boundary, where airport fire services cannot be used. Quite contrary to this, however, some countries are actually reducing rather than improving current levels of airport fire cover which is difficult to understand.

- Although airworthiness requirements aim to minimise the chances of fuel being spilled during a survivable take off and landing accident, spillage still occurs. Compliance with these regulations needs systematic monitoring by the authorities and guidelines issued where appropriate.

Again some additional research effort is needed in these areas, mainly ergonomic study into installation aspects, but we think the case has been made in research and accident analysis over the years to justify action in these areas.

Evacuation factors

Finally we come to the need for fast and orderly evacuation. Research over the last ten years suggests that the most important factors are:

- the cabin environment and in particular the presence of fire, smoke, toxic fumes in the cabin
- the configuration of the cabin, in particular the seating configuration near the emergency exits, the ease of operating the exit hatch and the bulkhead aperture
- the behaviour and crowd control skills of the cabin crew during emergency evacuations and
- passengers' knowledge of safety procedures

Evacuation measures

Measures ready for adoption in the short term which would increase evacuation speed and efficiency include the need to firstly

- Increase the aperture between bulkheads to 30 inches. I know this is a subject of current consultation of the JAA, but it seems to be taking a disproportionately long time to resolve at European level.

- Train cabin crew in crowd management skills and to act assertively in case of emergency evacuations.

So, these are our conclusions on priorities in aircraft cabin safety. None of these ideas are new and despite the efforts of individual aviation authorities and the European Commission, both the research and development and the harmonisation effort in Europe have yet to give these issues the prominence they deserve.

Need for the Single European air safety authority)

Therefore, the sooner the proposed European air safety authority can be set up the better. Our expectation is that such a body should take the lead in developing and implementing a targeted and research-based European air safety strategy. This would need to be in accordance with EU Treaty obligations to deliver high levels of safety in the harmonisation process, encouraging open debate on air safety needs through transparency in decision making, and to be fully accountable to the EU institutions.