

Passenger Assistance System

Post-accident evacuation management

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- What is a PAS
- Background to why it is needed
- Research programme.
- Way forward





- Post-accident evacuation passenger management
- Getting to the foot of the slide is not enough!
- Getting to a place of safety is required
- Research to look at ground-based passenger assembly points.
- An integrated process – e.g. cabin safety cards rarely give any passenger guidance beyond the base of the slide

Passenger Assistance Systems (PAS)

- Background – new generation of large aircraft (Airbus A380 certificated to carry 853 passengers plus 20 crew, 1000 seat aircraft anticipated)
- Fast evacuation is essential for survival in accidents involving fire (target <90seconds)
- Passenger evacuation procedures in cabin and on slides, well researched and developed
- Increasing concern to ensure that passenger management issues are considered post evacuation.
- Goal to enable all passengers to travel with maximum safety speed and efficiency from their seat on the aircraft to safe area away from the immediate danger of the airframe.



Boeing Phantom Works

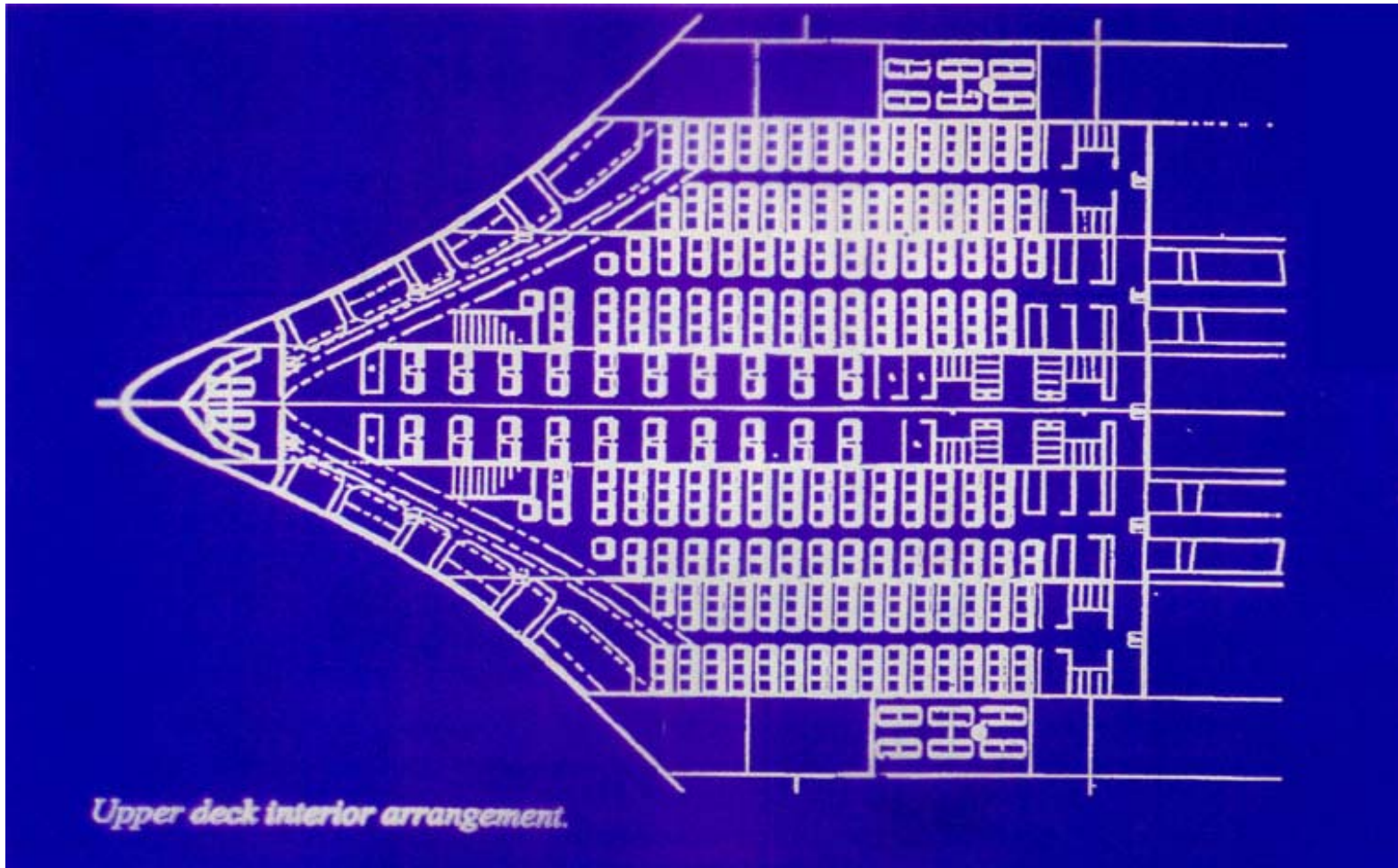
Crimfield Aerospace

U.S. AIR FORCE

NASA

Gulfstream

BWB internal



Typical accident scenario

- Fire fighters will often arrive at an accident site with a major fire underway with some, perhaps many, passengers having escaped plus others remaining trapped in the wreckage.
- First priority is fire fighting, very limited resources for passenger management
- Additional resources should arrive over a timeframe dependent on accident circumstances
- We are looking for PAS to be an immediate resource lasting no longer than 30 minutes, whilst other aid arrives.

PAS Deployment

- Possibly ejected en-route to fire, at appropriate location close to accident site
- Self-assembly
- Potentially lightweight pneumatic structure
- How big?
- What shape/colour/facilities?
- Working with Newcastle University UK









Factors Influencing Survival in Accidents

Crashworthiness and Fire Protection	Seat strength (16g), fire blocking materials in seats, airbags, seat belts.
Interior configuration	Numbers and location of exits, space between seats and exits, etc.
Crew performance and emergency procedures	<u>Pre-flight briefings, safety cards</u> , numbers of crew
Evacuation aids	Exit signs, floor proximity lighting

Post Accident Survival Factors

- Number of passengers
- Number and extent of injuries
- Location of Aircraft
- Airport Fire Services
- Airport Facilities
- Police Service
- Medical Support Team
- Environmental Conditions e.g. weather

In-Cabin Passenger Behaviour and Survival

- Accuracy of perception and source of threats
- Frequency of flying and level of education
- Knowledge of aircraft and safety procedures
- Situational awareness of location, exit routes, exits and assembly point(s)
- Behaviour and characteristics of other passengers.
- Personal characteristics, e.g, age, gender, culture

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Passenger Behaviour Post-Evacuation

- Traumatized passengers a hazard for fire vehicles
- Crowding at bottom of slide
- Affiliative behaviour
- Reluctance to move away from slide
 - Increased risk of injuries
 - Danger if aircraft explodes
- **Major issue for fire and rescue personnel**

Human Performance Factors in the development of PAS

1. People – move towards objects rather than away from them
2. Perception influenced by:
 - Past experience
 - Expectations
 - Likely costs/benefits
3. Under stress human attention is memory impaired
4. Difficult to train members of public
5. Importance of intuitive method of use (Naturalistic decision making)

Proposed Passenger Assistance System

- Assist passenger management post-evacuation
- Provide attraction – assembly point
- Passenger directed towards clearly identifiable location.
- Location/s determined and positioned by fire/rescue crew on approach to aircraft

What do we do at the moment?

What do we do at the moment?



What do we do at the moment?



What are we looking to do?

- Explore the possibility of developing equipment for passenger assembly management (PAS), deployed by a fire fighting team immediately prior to arrival at the crash site
- PAS must self-construct, regardless of orientation and terrain. It may be on trailer and/or vehicle used for other non-emergency airfield duties.
- PAS should not be affected by strong winds

Design Considerations

- PAS needs to be a recognisable focal point that people will move towards
- PAS needs to be very visible, in an environment that may contain significant fire and smoke.
- PAS could provide limited shelter and first-aid facilities for the injured.
- Criterion and procedures for deployment by fire service must be clear and not cause delay.
- Briefing for passengers must be clear and understood by all nationalities.

Project Plan

- | | |
|----------------|--|
| Stage 1 | Human Factors Review of design criteria and Operational Issues |
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Stage 2 |
Technology Review including: <ul style="list-style-type: none">- Assembly system- Shelter system |
| Stage 3 | Prototype designed and developed and pilot tested |
| Stage 4 | Prototype tested using representative passengers in both day and night conditions, possibly during airport emergency plan exercises. |



- Not a UK-unique problem
- Maximum safety benefit will come from a common international approach
- Invite interested parties to share in planning the studies
- Promote within ICAO



Questions?

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