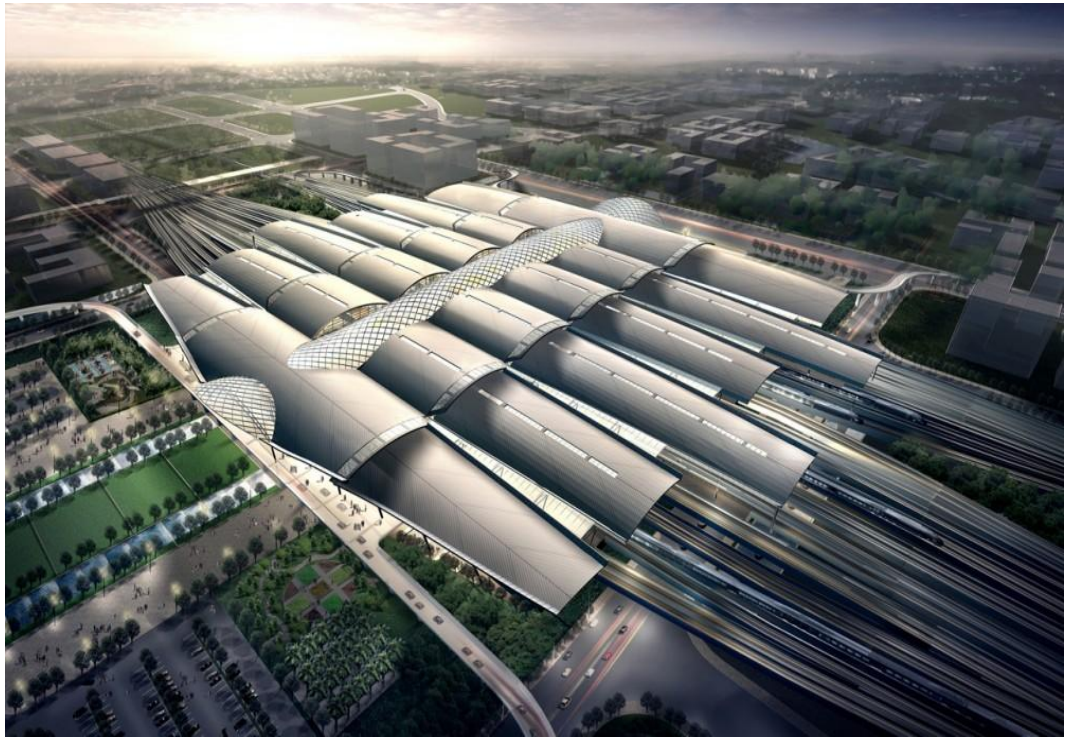
Aviation Health & Safety Risk in a Live Operating Environment

Ben Beard | April 2013

EC HARRIS
BUILT ASSET CONSULTANCY
AN ARCADIS COMPANY

Railways & Airports – What's the Difference?

Hong Kong International Airport



Guangzhou South Railway Station

EC HARRIS
BUILT ASSET
CONSULTANCY
AN ARCADIS COMPANY

Where are the Health & Safety Risks at Airports?

Airbridge collapse – Chek Lap Kok Airport

China Airlines cra

Terrorist attack – Glasgow Airport

Roof collapse – Paris Airport

EC HARRIS
BUILT ASSET
CONSULTANCY
AN ARCADIS COMPANY

Safety Systems in Airport Live Operating Environment

- All airports governed by ICAO (International Civil Aviation Organisation) standards Annex 14
- Countries own government department responsible for implementation of Health & Safety standards in conjunction with Airport Operators
- Operations and Project teams at airports are responsible for ensuring employees, passengers and anyone using the operational envelope are safeguarded against unnecessary risk

EC HARRIS
BUILT ASSET CONSULTANCY
AN ARCADIS COMPANY

What are the biggest Health & Safety Risks at Airports?

- Risks to employees/passengers within the terminal buildings, e.g. slips/trips/falls, illness etc.
- Risks to baggage handling staff caused by incorrect manual handling procedures or procedures not followed correctly etc.
- Risks to ground service handling staff, e.g. vehicle collisions with other vehicles, incorrect procedures followed, slips/trips/falls, fuel spillages etc.
- Risks to all employees/passengers caused by adverse weather conditions
- Risks to employees/passengers caused by runway excursions and incursions
- Risks to employees/passengers caused by FOD (Foreign Object Damage)

EC HARRIS
BUILT ASSET CONSULTANCY
AN ARCADIS COMPANY

Safety Systems Auditing - Airside

- No FOD present
- Surface condition is suitable
- No birds or other wildlife are present
- Paint markings are visible and correct
- Signs are visible and correct
- Lighting is serviceable
- Equipment provided is safe for use
- Adverse weather contingency plans in place, e.g. plane de-icing, snow clearance, typhoon procedures etc.

Beneficial to repeat inspections during low visibility conditions

EC HARRIS
BUILT ASSET CONSULTANCY
AN ARCADIS COMPANY

Safety Systems Auditing - Landside

- Regular inspections carried out of ALL areas landside, frequency to be agreed by operational team
- FOD removal if necessary
- M&E systems inspections carried out by suitably trained and qualified staff
- Integrity of boundaries between Landside and Airside regularly checked
- Adverse weather contingency plans in place
- Regular audited meetings between Landside and Airside safety committees to eliminate and/or reduce hazards, acts and situations ALARP, as well as to prevent and/or reduce accidents, incidents and occurrences

EC HARRIS
BUILT ASSET
CONSULTANCY
AN ARCADIS COMPANY

Landside/Airside Safety Committee

- Promotion of safety awareness through training, licensing and publication of safety bulletins
- Establishment and discussion of local safety procedures and guidelines
- Accident, incident and occurrence reporting and investigation, data analysis and dissemination of trends, common causes etc.
- Generation, evaluation and recognition of safety suggestions
- Preparation of regular joint safety campaigns
- Discussion of forthcoming Landside/Airside works programme

FOD Removal –Why is it so Important?

- Air France Flight 4590 - Charles De Gaulle Airport – 25/07/00
- Five minutes before the Concorde took off, a DC10 had lost a titanium alloy strip, 435 millimetres (17.1 in) long and about 29 to 34 millimetres (1.1 to 1.3 in) wide, during take off from the same runway
- Concorde tyre delaminated when it ran-over strip at 90% take-off speed
- Tyre pieces struck underside of port wing (at 310 mph) rupturing fuel tanks and severing wiring
- Electric arcing caused by severed wires ignited fuel
- Concorde lost airspeed and altitude and crashed with the loss of 109 passengers and crew and 4 people on the ground

EC HARRIS
BUILT ASSET
CONSULTANCY
AN ARCADIS COMPANY

Concorde Accident Conclusions

- Fuel transfer during taxiing may have overfilled the number five wing tank
- French authorities acknowledged that a required runway inspection was not completed after the Continental (DC10) take off, as was protocol for Concorde-take off preparation
- The fire caused damage to the port wing, and it began to disintegrate
- Fuel tanks and ancillary systems reinforced with Kevlar on entire Concorde fleet

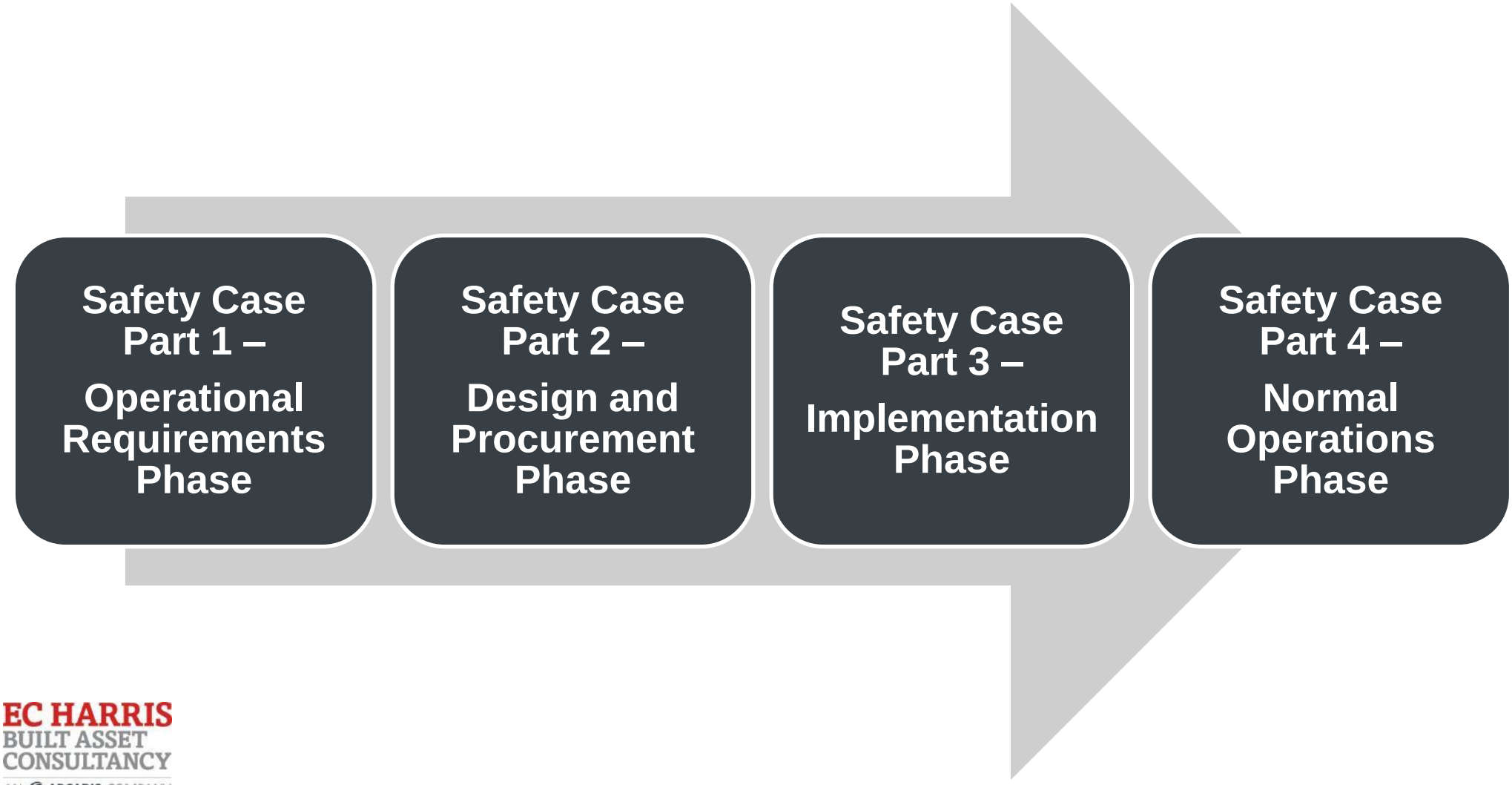
The Concorde crash demonstrates a failure of Airside safety systems, it was a number of failures that ultimately caused the accident

Asset Management Safety Systems

- Vitally important to address maintenance responsibilities, ownership of items as well as removal from and return to service providers
- All assets should have clear owner within the organisation – Should be named individual to ensure clear responsibility for each asset
- Contingency plans exist to deal with failures
- Staff training on how to operate the asset
- Maintenance inspection regime
- Operational time windows should be agreed to define when maintenance work can occur
- Safety records are maintained

Building a Safety Case – What is it?

- A Safety Case is an explicit documentation of a safety critical system, its corresponding safety objectives, and the associated safety risk assessment and risk management of the system, at appropriate milestones in the life of the system.



EC HARRIS
BUILT ASSET CONSULTANCY
AN ARCADIS COMPANY

Safety Case Part 1 - Operational Requirements Phase

- Safety Objectives and the corresponding Safety Requirements.
- Initial document provided to advise the proposed project's existence and its safety significance.
- Preliminary System Safety Assessment (PSSA), supplemented as necessary by overseas or previous experience, and in-house expertise and knowledge of deficiencies in existing systems which the new system is to replace.

Safety Case Part 2 - Design and Procurement Phase

- Essentially to assure that the design of the system supports and provides for the safety requirements - arguments to support the design rationale and the proposed technology of the system, and to verify and validate that such satisfies the safety requirements will be provided.
- The human factors aspects of the design, and the safety implications of the design of the procedures, and the ability of personnel to safely operate to the design procedures, should also be considered.
- A full hazard and risk evaluation of the detailed design, including hardware, software, man/machine interface, human factors, equipment and administrative interfaces and external factors, should be undertaken.

Safety Case Part 3 – Implementation Phase

- An analysis of the safety situation following its installation and integration. The functional testing to be carried out for installation and pre-commissioning evaluation of the safety situation is detailed in this part.
- A testing regime aimed at validating the risk assessment made in Part 2 of the Safety Case, and identifying safety hazards not previously identified at Part 2 which arise during testing and integration and related activities, should be defined , with the strategy for assessing and managing these hazards and the safety issues which arise from such testing also specified.

Safety Case Part 4 - Normal Operations Phase

- Provide evidence that the system is safe in operational service. It will address all relevant operational and management issues, and will take account of the safety findings from the preceding three parts of the Safety Case
- A living document for the life of the system - to define and document any further hazards, identified at post-commissioning or during routine operations, and the risk control actions taken to maintain compliance with safety objectives, in the light of actual day-to-day knowledge and experience with the system

Example of Safety Case

1 Title

2 Purpose/Background/Operational Requirement

3 Scope

4 System Overview andDescription

5 VHF Communication System Overall voice comms system description/performance standards/overview/ bearers/third party provided services.

6 New ATC Procedures and Staff

7 Logistics support

8 Safety Requirements

9 Assumptions, Constraints and Dependencies

10 Responsibilities

11 Consultation and Communication

12 Design Process

13 Design Safety Risk Management - HAZID and HAZLOG reviews

14 Design Limitations and Shortcomings

15 Implementation Process

16 Status of Safety Controls and Safety Requirements

17 Engineering Support and Engineering System Maintenance

18 Criteria for Maintenance

19 Safety Performance Monitoring

20 ATC Staff Training and

21 Pilot Information Package

22 SystemTransition Plan

23 RAM End-to-End System Analysis

24 System Test Procedure

25 System Test Results State the outcome of the system tests undertaken

26 Define the System Safety Risk Management plan

27 Define Risk Management Process used for the Safety Case

28 HAZID Provide the record of all HAZID activities undertaken

29 Status of Hazards (HAZLOG)

30 List all Hazards not controlled to tolerable level

31 Post implementation review plan - performance and safety of the system

EC HARRIS
BUILT ASSET CONSULTANCY
AN ARCADIS COMPANY

Aerodrome Safety Management Systems and Safety Auditing

Aforementioned systems are required to be in place and implemented and consist of a cyclical process, including:

- Written safety policy
- Organising and training staff
- Establishing safety culture and communication systems
- Planning and setting standards (safety cases)
- Elimination or effective control of risks
- Performance management
- Active monitoring of compliance and reactive monitoring of incidents

Questions

EC HARRIS
BUILT ASSET CONSULTANCY
AN ARCADIS COMPANY