Tightening the Safety Net in a Multi-Dimensional Flight Test Organization

Terry Lutz
Airbus Experimental Test Pilot
Toulouse, 30 June 1994, A330 F-WWKH

- TOGA Thrust, 42% cg, 2.2 units nose up trim, alt capture set at 2000’
- AP engaged, Eng 1 cut, hydraulics cut with CB.
- AP captures 2000’ and increases pitch attitude to 32 degrees
- Airspeed decreases to 100 knots, 18 knots below Vmca

- 7 Fatalities
Airbus Flight Multi-Dimensional and Multi-National

- 5 Significantly different aircraft types

- 4 Widely separated flight test sites: Toulouse, Hamburg, Seville, Tianjin

- 7 Nationalities among the Pilot/FTE/TFE group
For Example: A400M Flight Testing

2 Flight Test Centers

- Toulouse, FRANCE
- Sevilla, SPAIN

Interoperability between the 2 FT Centers

Telemetry capability across Europe with stations in Getafe, Bremen, Hamburg, Filton, Toulouse and Sevilla
The Basic Safety Net

- A concept with origins at EPNER
  **Ecole Personnel Navigant Essais et Reception**

- The Flight **Test** Engineer – **Test Team Leader**
  - Receives the Flight Test Request
  - Generates the Test Order
  - Briefs the flight and acts as test director in flight
  - Completes the Post Flight Report

- The Pilots
  - Participate in development simulation before flight
  - Coordinate weather, airspace, brief the Flight Test Controllers
  - Fly the airplane precisely to gain the data required
  - Provide input to the Post Flight Report
## Additional Key Players With EPNER Training

### The Test Flight Engineer
- Prepares all aspects of the airplane
- Manages installation and checkout of the FTI
- Authorized to taxi for engine runs and systems checks
- Assists pilots to set specific thrust requirements as required
- Back-up for all procedural tasks on the flight deck

### The Flight Test Controller
- Receives the airspace requirements from the pilots
  - Position, altitude, speed, maneuvers, in terms of time
- Coordinates airspace with other test regions
- Coordinates airspace with GAT controllers
- The Concept: One airplane, One controller, One frequency
Specialist Support Through Telemetry

- Telemetry – “Tango Mike”
  - Flight monitoring in Toulouse, Sevilla, and remote sites in Europe
  - Specialists for each test event are involved with:
    - Mission planning
    - Flight briefing
  - Flight monitoring
  - One voice on frequency, backed by several specialists
  - The last line of defense!
The Safety Net Webbing

FTE

TM

PF

TFE

PNF
“Fuel ... check. Lights ... check. Oil pressure ... check. We've got clearance. OK, Jack—let's get this baby off the ground.”
## EV “Ice Bucket” Meetings – Each Week

- Soooo, how long can you hold your hand in that ice bucket, anyway??

- Chaired by the Chief Test Pilot
- Attended by SVP of Test and VP of Flight Test Engineering
- Dedicated VideoConference links to Germany, Spain, and Tianjin, China

- A well-attended, open invitation to put safety topics on the table, or debrief recent safety events
The Connection To Product Safety

• Necessary when failures/events occur in flight test that can also happen in the operational fleet:

• Example:
  
  • Broken flap control rod
WELCOME in the Flight Test Ishare!

You will find very useful data in this collaborative area. Are you new here? Get familiar with IShares and click here.

- Learn what is going on in the Depeche.
- Know the flights scheduled today and tomorrow in Flight Schedule and EV Planning tool or find out about the weather.
- Participate actively in your group area.
- Read EV reference documents (DRR, FOM, PTE, SCM, GTS)
- Read Airbus reference documents

Welcome to iShare

Please note that Collaborative Space has a limited size. Over this limit, you would not be able to add any new information. So please, when the collaborative work on files is finished, move (to shared folders, DMS, etc.) or delete them.

If it is your first time in this Collaborative Site, please read the Start Here notes first and if you are a beginner, access the Help menu on top of this page.
Quick Information

Links to the Flight Test Guide

45 Ops & Safety Events in 13 months: 3.5/mo
Special Access Req’d
EVR Online Report Form

- Used mainly for production test flights

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**EV FLT OPS EVENT REPORT**

<table>
<thead>
<tr>
<th>DATE:</th>
<th>Location:</th>
<th>PCB:</th>
<th>Flight No.:</th>
</tr>
</thead>
</table>

**Event Type**

- Weather
- Birds
- ATC
- Other

**Effect of the Event on Flight:**

**Event Description**

**Nature of Flight**

<table>
<thead>
<tr>
<th>Operational Phase:</th>
<th>C.Ldg</th>
<th>C.OFF</th>
<th>C.T/O</th>
<th>C.RIC</th>
<th>C.Eng</th>
<th>C.Oth</th>
</tr>
</thead>
</table>

**Weather**

<table>
<thead>
<tr>
<th>Wind Speed</th>
<th>TEMP</th>
<th>GMR</th>
<th>VIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cloud</td>
<td>PRECIP</td>
<td>Lightning</td>
<td>Rain</td>
</tr>
<tr>
<td>Icing</td>
<td>Cloud Ceiling</td>
<td>Icing</td>
<td>Turbidity</td>
</tr>
</tbody>
</table>

**Flight Operations Details**

- CM: CM1, CM2, FTE, GTE
- Data: Date, Name

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Click here to send report to EVR

Remarks may need to be checked.
EVT Ops and Safety Event Form

- Used mainly for experimental and developmental test flights
Example Events

1. Rapid Depressurization at FL410

2. Loss of Emergency Buss Bar in EMER ELEC
Rapid Depressurization at FL410

- Customer Acceptance Flight Profile
  - 10 people on board
  - 3 crew + 1 obs seated in the cockpit
  - 1 obs standing in the cockpit doorway
- CPC checked in Sys 2, then switched to Sys 1
- Sys 1 failed internally and both OVFVs went full open
- Pilots and FTE went immediately on oxygen
- FTE initially tried to control the cabin in Manual mode
- Cabin rate peaked at 18,000 fpm
- Emergency descent initiated in 1 min, but cabin climbed to FL300
- 2 observers in the cockpit suffered LOC
- 4 additional with LOC in cabin – PSUs in test mode
Lessons Learned – Rapid Depressurization

• CPC switching check and depressurization now done at FL310
• Maintain CPC in auto to utilize safety feature of OFVs
• Limit cockpit occupants to the number of oxygen systems
• Non-crewmembers must be seated with oxygen readily available
• PSUs in that area to be operated in Normal mode
Loss of Emergency Buss Bar During RAT Testing

- **Purpose of the flight:**
  - FQI performance and fuel pump restart in EMER ELEC configuration
  - All 4 Gens switched OFF
  - Briefing included switching Gens ON with any **electrical** anomaly
  - In EMER ELEC, alerts for F/CTL and WHEEL were missing
- **Post flight analysis:**
  - FWS 1+2 were reset and alerts were recovered
  - After 30 min in EMER ELEC, TM advised:
    - Bus powering DC ESS is lost and DC ESS powered by BAT EMER
    - No FWS warning to crew (included in the next SW cycle)
  - Bus powering DC ESS is recovered by cycling CBs

- **Bus powering DC ESS is recovered by cycling CBs**

- **Post flight analysis:**
  - Had CB reset been delayed by 3-4 min, voltage drop would have inhibited recovery of all 4 generators
Lessons Learned Following Emer Buss Bar Loss

- Improve briefings to include:
  - Better risk analysis of specific failures
  - Status of current warning systems
  - Emphasis on restoring generators with buss bar failures
- Flights requiring entry to EMER ELEC must be followed by TM
“An error doesn’t become a mistake until we refuse to correct it”

- John F. Kennedy