

Accident/Incident Investigations: An opportunity for the Manufacturer to enhance the Product Safety.

The Airbus DS experience

MASI 2017 – San Diego (USA) August 21^{st} , 2017



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Airbus DS/Military Aircraft portfolio

Military & Transport Aircraft Europe C212 113 Operators oDL 13 13 25 CN235 214 493 Combat C295 692 Transport 1185 CIS **P3** & Mission MRTT (m) 2 (V)2 = 4400M 34 12 Eurofighter Germany 10 Leading Fleets CAE Availon Canada* Incland 1 Royal Canadian Air Force 7 Ideh Air C COC Adattor North America Z Air Force I Pinet Fr. Societe Centre Aerostock Z d'Enseel Kazakhstan Alt Fares 17 United States Asia & Pacific C C C C C At force AARAIde Secr. Gen. Peecs bekistan 10 (22 Intern Alt SASEMAR Kores Coast Guard Rep. Of Kores Air For Afghanista SauthKore Portuga Air force ET Urick Morocco Algeria Egyp Pakist Royal Thai Array Alt Force México Vistnam! UAE E Marine Police People's Air force At force Dominican Rep Ar Fors Nerry Air Force Qman. Thaila Senegal Ale See Philippines" anamá Mir Porce 53 Malaysia Burkina Faso Royal Oman Pollor Royal Malayalan AF Kiribati Air Force Ghar Colombia (not to ecale) Indonesia At force Singapore. * Pending Deliveries Ecuado Kuwalt Air Force Par Palla AS German Af Army Papua New Guinea Brazil Middle East & Defence Force **Opanish** Af Caribbean & 2 Navy 148 North Africa Others e. Air Force Latin America German Al () 9 11 Africa French AF 曲)12 (V) 22 Spanish Af Air Force The Airec Millio Australia. V) 14 12 🔽 Royal Australian Air Force BAF - UK COG Aviation Turkish Af Stytudes Austalia Belgium AC Wiltares CT Africa Royal Malaysian AF Artos 32 Luxembourg AF Uruguay MMF Alt Fora (Na) POKAP Argentina Army RAAF-Australia Alt Force French Air Force Leading Operators & FH Fleets & Flight Hours Bing Country Gov of Singapore Color Codes C212 Eurofighter >300000 >3400000 Eurofighter RAF > 100000 MAL CN23 >1000000 > 90000 FAF >5000 A 400M WALLMATT stands for Netherlands Indonesian Police 0295 >290000 A400N > 12000 MRTI RAF >40000 ATTALEEM/Burnfighte stands for Belgium Baudi Arabia Mol P3 >10000 C295 Soanish AF >54000 Fleet color codes Bearthian Al ATTACK IN CO. A400M / M BL FAF CN235 >100000 Indonesian AF mber of Countries Vietnam's People C 2 12 Ryan Air (USA) >10008M< Number of Operators

This map reflects our fleets data at the start of 2017. For any inquiries, please contact us at: Serv.Eng_Fleet.Data@airbus.com

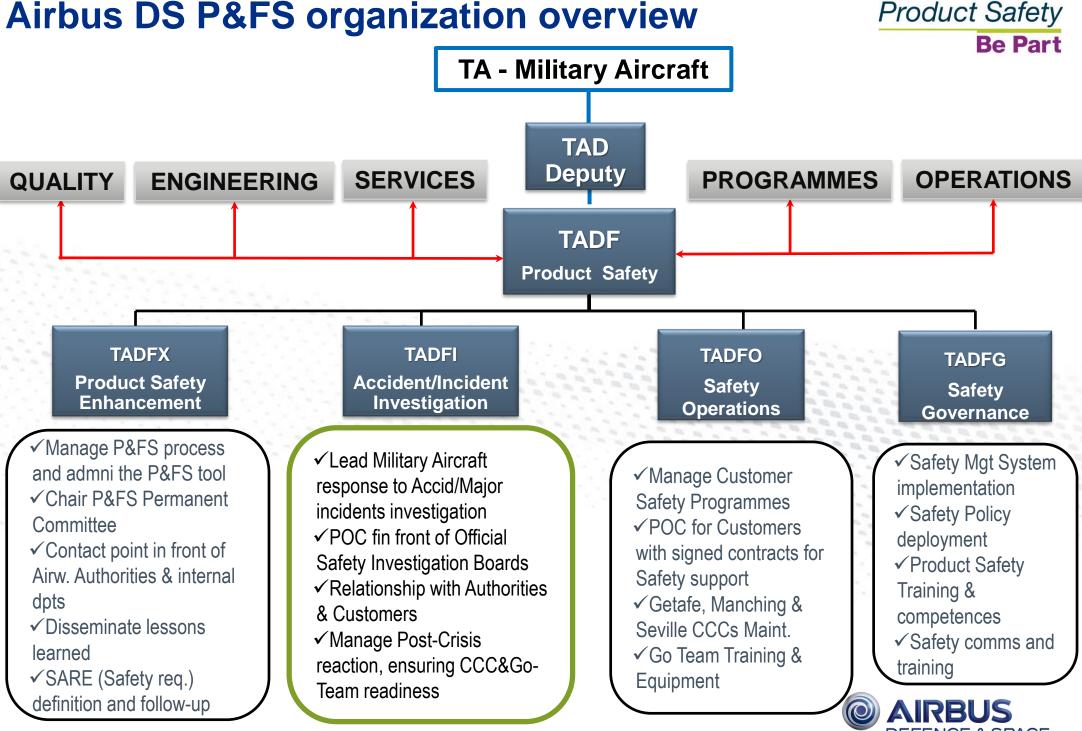
Be Part

Product Safety

Blue Country names Indicate recent A/C deliveries

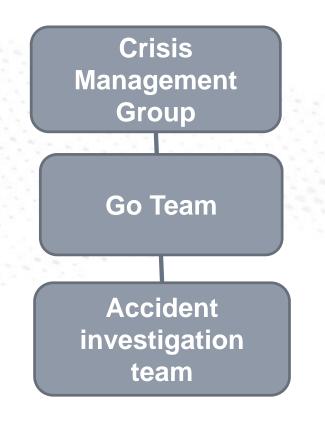
Indicates.

Airbus DS P&FS organization overview



Accident/Major Incident Management Process

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Accident & Incident
Investigation
(PG-144)
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To manage the initial hours from the Crisis Control Center: Support to operator; Collection of initial facts; Authorities contact; Customers Information, Media relations Your Single Point of Contact / FULL CONFIDENTIALITY

Small Group (4-6) to be detached to crash site, for collecting evidences to be used in the further investigation. Reaction time 4 – 6 hours Support to the Official Investigation Board.

Group of Specialists to perform all investigation activities until full explanation of the events. Identification of findings and safety recommendations. Final report (as technical advisor) released only to affected customer under main principles of mutual trust and full confidentiality.

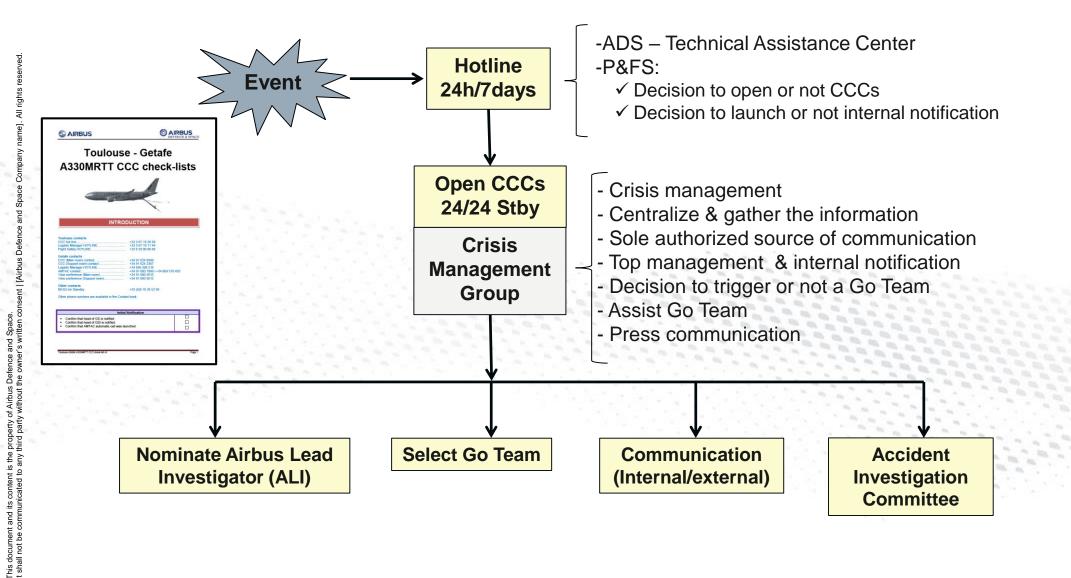


Product Safety

Be Part

Acc./Inc. Management Process

Product Safety Be Part





2009-2016: Incident and Accident overview (1/4) Product Safety Be Part

INCIDENTS

2009

2010

2011

2012

2013

2014

2015

2016

Year	Incidents	Systems related	Operational related	Others [Wx, B]		COUNTRIES WHICH REQUESTED
2009	4	3	1	0	0	SUPPORT (all Mil Investigation Boards):
2010	11	3	6	2	1	 2010: Chequia 2011: Equator , Spain
2011	6	3	2	1	2	2012: Equator, Spain, UAE
2012	3	0	2	1	3	2013: N/A
2013	5	1	4	0	0	2014: UK, Spain
2014	10	4	5	1	2	2015: France (x2), Jordania, Brasil
2015	13	5	8	0	4	2016: Spain, Jordania, Brasil, Saudi Arabia,
2016	12	8	3	1	6	Australia
TOTAL	64	27	31	6	18	
15 - 10 - 5 -	Others Operational re Systems relate					Incidents: Support requested by Military Investigation Boards

reserved

2009-2016: Incident and Accident overview (2/4) Product Safety Be Part ACCIDENTS

Year	Accidents	Systems related	Operational related	Others [Wx, B]	Support requested by InvBoard	COUNTRIES WHICH REQUESTED
2009	2	0	0	2	0	SUPPORT (all Mil Investigation Boards)
2010	2	1	0	1	2	2010: Congo, Spain
2011	3	0	2	1	3	2011: Canada, Chile, Indonesia
2012	2	0	0	2	1	2012: Argelia
2013	1	0	0	1	0	2013: N/A
2014	3	1	0	1	2	2014: Germany, Spain
2015	2	1	1	0	2	2015: Colombia, Spain 2016: Vietnam, Jordania
2016	3	1	0	1	2	2016. Vietnam, Jordania
TOTAL	16	4	3	9	12	
4 +	Operational related					Accidents: Support requested by Military Investigation Boards 25% 75% Requested Not requested
o 📙						

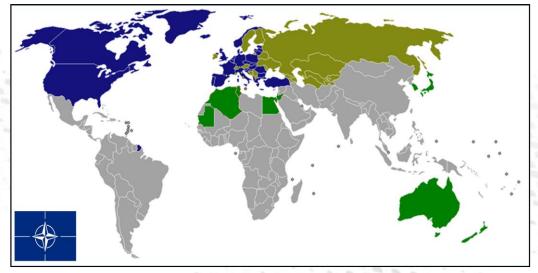
Product Safety 2009-2016: Incident and Accident overview (3/4)

LESSONS LEARNED AND AIRBUS DS EXPERIENCE - 1

- ✓ ICAO Annex 13 does not apply !!, although in some cases is used as a valid reference.
- \checkmark Something similar established in NATO countries by STANAG 3531, although explicit Manufacturer role is not stated.

ICAO Annex 13 (191 countries).





NATO countries (28) and associated (22+15)



Be Part

2009-2016: Incident and Accident overview (4/4) Be Part LESSONS learned AND AIRBUS DS EXPERIENCE - 2

- As a general rule, Armed Forces are reluctant to accept immediate technical support. When accepted, official request usually comes after days or even weeks since the accident/incident occurrance.
 - Condidentiallity issues involved: Mission, sensitive geographical location, etc.
 - Initial intention to keep the investigation 'in-house' with own resources.
 - Unfamiliarity with Airbus DS Accident/Incident management process.
- As a consequence of the above, high risk of losing key evidences for detailed investigation (wreckege removal, parts missing, recorded data loss, etc).
- With the exception of some nations (UK-MiIAAIB, France-BEAD, Spain-CITAAM, etc), not a dedicated Mil Accident/Incident Investigation Organization is established.
 - Support request for incidents low (28% against 75% for accidents)



(1/4) *Product Safety* Be Part

Incident 27 February 16: C-295 Brazilian AF MLG collapse - 1

- ✓ Incident occurred in Surucucu (Estado de Roraima, Brasil)
- ✓ Challenging runway, asphalt, poorly maintained: 1080x30 mts, outstanding slope (20° RWY30 along 300 mts to decrease downto 5° at the end).
- ✓ MLG collapse at touchdown/ No fatalities









Incident 29 March 15: C-295 Brazilian AF RMLG collapse - 2

- ✓ Historic background: Three (3) similar events
 - ✤ 30 January 2007, Palmeras do Javari
 - 13 January 2011 and March 2015, both in Surucucu
- Although no GoTeam sent, full Airbus DS involvement as Technical Advisor in front of the FAB since first event.
- Operational contributing factors identified: Landings on challenging runways which lead to touchdowns at loads levels beyond the certified limits.
- Specific understanding about FAB operations led to foster a MLG improvement to be offered to C295 operators.
- A major design change process was approved in 2011. In the mean time, operational recommendations were addressed to help crews to handle challenging landings.
- \checkmark An SB to strengthen the MLG is already avail.





Accident 31 July 15: CN-235 Colombian AF crash - 1

- ✓ Accident occurred around 20:30 UTC (15:30 LT Colombia)
- ✓ Poor local weather conditions at the time of the accident
- The Colombian Air Force stated that the pilot reported an engine failure prior to the accident
- Crash: Departm. del César (NE Colombia), close to Venezuela
 Hull loss / 11 fatalities





Accident 31 July 15: CN-235 Colombian AF crash - 2

- Airbus DS Accid/Incid Management Process activated on August 1st
- ✓ Following clearance from FAC, Airbus DS Investigation Team detached to Bogotá from 10th to 20th August (2xP&FS Investigators, 1xStructure +1xPowerplant specialist and 1xInstructor Pilot)
- ✓ Information available: FDR, CVR, aircraft documentation, wreckage pictures and some parts (engines, props and some panels).
- ✓ Airbus DS Investigation Report issued on September 4th
- Most probable cause: Inadvertent ice accretion. Contributing factors:
 - Crew failure to manage WING OVERHEAT emergency procedure while flying in icing conditions.
 - Sustained flight in icing accretion conditions even with stall warning active.
- ✓ **Safety Improvement**: Specific SB to implement an advanced stall warning when flying in icing conditions

Conclusions

- 1. Early Manufacturer involment in an Accident/Incident investigation is highly benefitial for both parties: Operator and Manufacturer.
 - On Operator side, by:
 - Increasing the Safety of the fleet through the improvement of Procedures and Enhancement of the Product.
 - Gaining confidence in the Product after an Accident or an Incident.
 - Having access to advanced investigation resources
 - On Manufacturer side, by:
 - Understanding the customer way of operating the Product.
 - Setting a mutual confidence which leads to enhance the Product.
- 2. Confidentiallity and mutual trust are key issues.
- 3. Not only accident investigations contribute to enhance the Product. Incidents become accident anticipators if they are not fully understood since the beginning. Manufacturer contribution to this understanding can be also key.





Thank you



