The challenges and lessons identified in successfully managing continued airworthiness in an “EMAR 21 like” environment – case of French organization MAWC – CY 2012
French Airworthiness regulation structure

Minister level

Order « Duties »
Order « Certification »
Order « Registration »
Order « Continuing airworthiness »
Order « UAS »

Decree 2006-1551

Authorities level

documents:
- applicable to State organisations and personnel
- applicable through contracts to industry

Instruction « Initial airworthiness »

- Essential airworthiness requirements
- Regulations considered as acceptable means of compliance
- FRA 21
- Forms

Instruction « Report of technical occurrences »

Instruction « Civil ADs and TCH technical directives »

Instruction « Continuing airworthiness »

- FRA M
- FRA 145
- FRA 147
- FRA 66
- Forms

DGA – Type certification authority

DSAÉ State Aviation Safety Authority

AMC & GM

Internal documents

Mementos and procedures

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Airworthiness FR organization – authorities in charge

DGA

Type certification and continued airworthiness authority

- Type certification:
  - Initial certification
  - Modification approval
  - Dealing with in-service events, issuing airworthiness directives if necessary

- Certificate of Airworthiness: each aircraft complies with certified type
  - Is produced in accordance with type certification
  - Is properly maintained, airworthiness directives applied

- Approval and oversight of organisations / maintenance personnel licences:
  - Design & production: FRA 21 (equivalent to EASA Part 21)
  - MRO: FRA M, 145, 66 & 147 (equivalent to EASA Part…)

DSAÉ (joint organisation under Joint Staff) continuing airworthiness authority
**Continued Airworthiness : definition**

- **Definition**: All tasks to be carried-out to verify that the conditions under which a type-certificate or a supplemental type-certificate has been granted continue to be fulfilled at any time during its period of validity.

- **A Key activity for DGA through « duties » order**: DGA shall
  - ensures the continued airworthiness of the products, parts and equipment which has been certified by checking that the conditions which led to the issuance of a Type certificate or a supplemental Type certificate continue to be satisfied;
  - analyses any occurrence which jeopardizes the flight safety or is likely to reconsider the Type certification and issues, if necessary, an airworthiness directive;

However, this activity needs the involvement of many actors.
The Continued Airworthiness process

- End users – maintenance/production
- Report
- Occurrence
- Military type certificate holder
- Application
- Type Certification Authority (DGA)
- Airworthiness Directive

Unsafe condition
- Modification or inspection (SB)

SB, OIT, SIL...
Main actors - challenges

- This activity is ensured mainly through
  - Type certification authority (DGA)
  - TC Holder (its duties are covered through the order “certification”)
  - Occurrence reporting actors (operators, maintenance organisations…)

- Key point : efficient interaction between the actors
  - reporting of technical occurrences to the TCH and the authority
  - relationship between the TCH and the authority
    - Most of the work (collecting data, analysis, proposal of corrective actions…) is generally done by the TCH but communication and coordination with the authority are necessary (alerts, continued airworthiness review…)
    - Continued airworthiness procedures of the TCH have to be analyzed during DOA audits

- In the military world some other points need to be taken into account (careful monitoring)
  - Continuity of technical support contract
  - The GFE for occurrence analysis
  - Interface with civil authorities for derivative aircraft
Occurrence reporting

- Specific Instruction “report of technical occurrences” (n°2011-161278) has been written detailing the type of technical occurrence to be reported to DGA (based on EASA AMC 20-28)
  - Definition: event related to a deficiency or a failure of a product, part, equipment or any component that could lead to a hazardous or catastrophic consequence
    - examples

- Entities which have to report:
  - End Users (CAMO)
  - Maintenance organisations,
  - Production organisations,
  - Flight tests organisations

- 2 levels of filtering:
  - Reporting to DGA: according to the instruction,
  - Reporting to the Type certificate Holder (or/and STC Holder…):
    - To be defined by the TCH
    - Includes at least the occurrences specified in the instruction.
Occurrences reporting process

End User (CAMO)

Type certification authority (DGA)

Type Certificate Holder

Production Organisations (FRA 21 F ou G)

Maintenance Organisations FRA 145

Instruction « Report of technical occurrences »
Airworthiness directives

- AD = technical decision (limitation, inspection or modification) following:
  - analysis of occurrences coming from the operator, maintenance, production,
  - other occurrences
  - recommendations from the military accident investigation board (BEAD)
- AD prevent occurrences which could lead to catastrophic or hazardous consequences in accordance with AMC 21A.3B(b) of PART 21
- The logistic impact of an AD is analysed with the CAMO prior to its issuance
- The CAMO can precise the terms of application of an AD (but not go against from its application)
- An AD issuance by DGA is not always the rule:
  - AD following a non-conformity in maintenance on case by case
  - Specific rules for civil product or civil derivative product, some products in cooperation (NH 90)
Interface with civil process/authorities

- **Aircraft 100% civil type certified (A310, A340, EC135, EC145, EA300, F900, CL415, Q400, F7X, A330, F2000, Engine CFM56, CF6-80, Makila, PT6 ...)**
  - Automatic recognition of the civil continued airworthiness activities (civil AD, change approved by civil authorities) through specific instruction: no need for DGA to reissue an Airworthiness Directive

- **Derived from a civil product. (EC725, AS565, AS532, F50 Surmar, F200 Gardian ...)**
  - Need to check the applicability of civil Airworthiness Directives
    - Analysis of the applicability of civil AD can be delegated to the TCH (MDOA privilege)
    - Management of civil AD is specified through the MDOA procedures and the airworthiness reference data sheet (document issued by DGA to DSAE and the operators together with the TCDS)
    - If applicable and if automatic recognition is not specified in the airworthiness reference sheet, an AD from DGA is necessary

- Exceptionally and for the previous two cases, the intervention of DGA could be necessary in case:
  - the responsiveness of the civil process is not fast enough
  - the civil AD is not appropriate due to a specific military use of the aircraft

- **Case of NH90, C135, AWACS**
  - Automatic recognition as equivalent to an AD for mandatory service bulletin issued by the TCH (NHI or Boeing)
Lessons learned

Current Issues

- Too many technical occurrences are reported to DGA: some refinements are necessary with the CAMO
- Distribution of the Airworthiness directives to all the CAMOs, FRA145/21G organisations and continuing airworthiness oversight authority (DSAE) is not optimal (internet diffusion to be investigated)
- Cooperation programme
  - Differences between the CAW system of the nations
  - Differences between national ADs related to the same unsafe condition, or specific national ADs => issue for the implementation of EMAR 145

Benefits of the system

- Clarification of the responsibilities of all the actors
- Robust process increasing the level of safety
  - not submit to the constraints of the configuration management process as there is a limit date
  - avoid that mandatory changes are not applied during a long period
- For Industry
  - Process/responsibilities in line with civil ones
  - Act without systematic involvement of the contracting authority
- For DGA
  - Better visibility of in service experience
- For the operators
  - Better guarantee that the technical events are correctly analysed and treated
About 50-100 ADs per year issued by DGA
Statistics by category

2010

- Fighters
- Transport and mission aircraft
- UAV
- Helicopter

2011

- Fighters
- UAV
- Transport and mission aircraft
- Helicopter

2012 (up to sept)

- Fighters
- Transport and mission aircraft
- UAV
- Helicopter
Conclusions (1/2)

- Many accidents have shown that the Continued AW process is a primordial activity for preventing catastrophic events (e.g., correction of design flaws, identifying precursors...)

- The Continued AW process is the first investigated area by a judge, who could prosecute the CAW decision makers in case of a proved inefficiency
  - After an accident, it is easy to show that no action has been taken by the authority after an occurrence, and that may be difficult to justify a judge who is not an aeronautical expert
  - It is therefore important to record also the rationale for any decision after an occurrence, even if the decision is not to take any measure
Conclusions (2/2)

- In an “EMAR 21” like environment, the major Continued AW key player is the Type Certificate Holder which has to collect, analyse and propose corrective/preventive actions to prevent a potential unsafe condition, but
  - It can work efficiently only if occurrences are reported which may not be natural for military users
  - It is necessary to take into account the end user operational/logistic constraints to avoid issuance of inapplicable corrective actions.

- The type certification authority is globally responsible for the CAW process:
  - Oversight of the efficiency of the TCH CAW process (through the DOA process)
  - Investigate at a minimum the most critical occurrences and review regularly with the TCH progress and decide after consultation of AD issuance
  - Ensure that the reporting process from reporting actors is in place
QUESTIONS ?

- A 310
- A330 AUG
- A 340 TLRA
- Alouette III
- Alphajet
- ATL2
- C135 FR
- CAP 10B
- CASA 212
- CASA 235
- CL 415
- Cougar
- Dauphin
- Dauphin Pedro
- Dauphin SP
- DHC 6
- DRAC
- E-2 C Hawkeye
- E-3 F AWACS
- EC 135
- EC 145
- EC 725
- Epsilon
- Extra 300/330
- F 406
- F10 MER
- Falcon Gardian
- Falcon 50
- Falcon 50 Surmar
- Falcon 900
- Falcon ARPEGE
- Falcon 7X
- Fennec
- Gazelle
- Hercules C130 H
- Jodel D140
- KC 135 R
- Lynx
- Mirage 2000 D
- Mirage 2000 C
- Mirage 2000 N
- Mirage 2000-5
- Mirage 2000 B
- Mirage F1 CR
- Mirage F1 CT
- Mirage F1 B
- Mystère 20
- NH90
- Panther
- PC 7
- PC 6
- Gliders
- Puma
- Q 400
- Rafale M
- Rafale B
- Rafale C
- Rallye
- SEM
- SIDM Harfang
- SDTI Sperwer
- Super Puma
- TBM 700
- Tigre HAD
- Tigre HAP
- Transall C160
- Transall Gabriel
- Turbofirecat
- Xingu
Acceptability of a higher risk during a limited period
Use of AMC 21.A3B (d) (4)

• Civil AMC 21.A3B(d)(4) could be used to calculate the allowed time for corrective action (e.g., case of engines)
### Examples of occurrences

<table>
<thead>
<tr>
<th>Engine failure</th>
<th>Fuel leak</th>
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<tbody>
<tr>
<td>Fires</td>
<td>Smoke, gas or toxic vapor</td>
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<tr>
<td>Fluid leakage</td>
<td>Flaps/slats failure</td>
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<tr>
<td>Landing gear failure</td>
<td>Braking malfunctions</td>
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<tr>
<td>Tire burst</td>
<td>Flight control events</td>
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<tr>
<td>Handling quality events</td>
<td>Loss of pressurization</td>
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<td>Loss of indications</td>
<td>De-icing malfunctions</td>
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<tr>
<td>Buffeting</td>
<td>Load factor</td>
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<tr>
<td>Malfunction of escape slides/rafts</td>
<td>Structural failure</td>
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</tbody>
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