EMAR implementation in Finland - Industry perspective

CONTENT

1. Military Aviation in Finland - background
2. Military Airworthiness in Finland - background
3. Finnish regulatory background and status of EMAR implementations
4. Key learnings and conclusions

1. Military Aviation in Finland

Patria

- F/A-18 C/D Hornet fighter (55/7)
- BAE Hawk 51A/66 jet trainer (18)
- Grob 115E/EA basic trainer (28 in upgrade)
- L70 Vinka basic trainer (26 in sundown)
- PC-12 Util/Transport (6)
- Learjet 35 A/S Util/Transport (3)
- Casa 295M Util/Transport (3)
- NH90 TTH Util/Transport/sof (20)
- MD500 E/D trainer/sof (7)

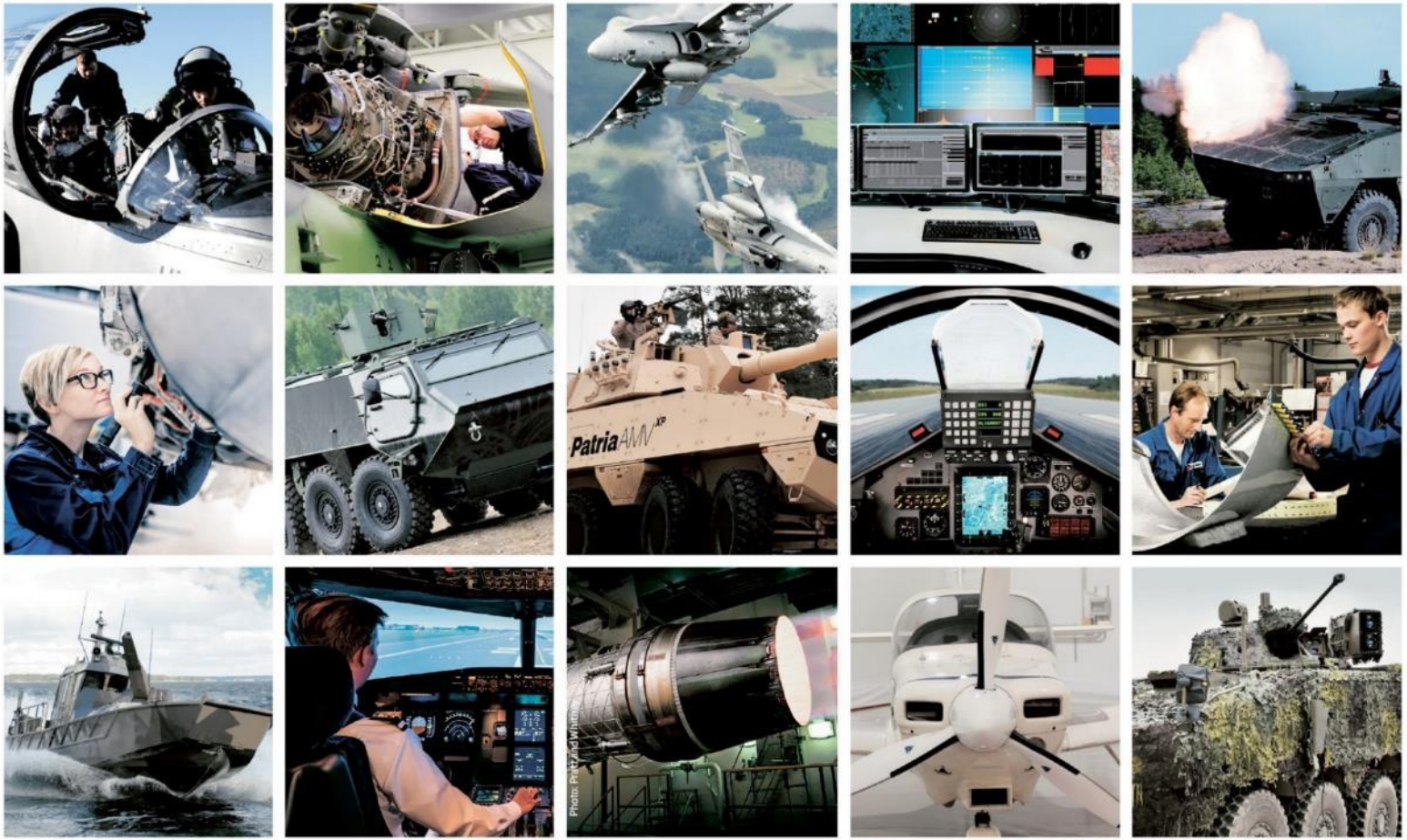








2. Patria



2. Historical overview

Heritage since 1921 when Air Force Aviation Factory was established in Viapori to build Hansa Brandenburg floatplanes under license.

316 Aircraft designed and manufactured
600+ Aircraft produced under license or as a subcontractor
4000+ Airframe heavy maintenance, repairs and modifications
5000+ Engine repairs and maintenance

Latest production programmes since 1960's:

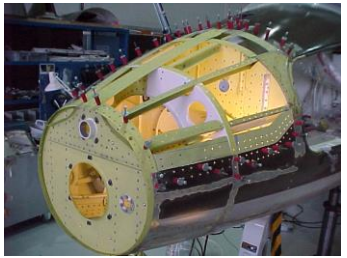
62 Fouga Magister in 1960's
12 Draken J35 in 1970's
46 Hawk Mk51 in 1980-85
57 F-18 C Hornet in 1996-2000
NH90 in 2004 ->

2. Type Certificates and approvals

- Traditionally Type certificates are held within country for all types in active use:
  - FDF is the MTCH for:
    - F/A-18 C/D Hornet fighter
    - BAE Hawk 51A/66 jet trainer
    - PC-12 Util/Transport
    - Learjet 35 A/S Util/Transport
    - Casa 295 Util/Transport
    - NH90 TTH Util/Transport
    - MD500 E/D

- Patria is the TC-holder and CAM responsibility for the nationally developed -23 cat trainers:
  - L70 Vinka
  - L90 Redigo (no longer in service)
- Patria also holds the Finnish MTC and CAM responsibility for:
  - Grob 115E(EA) basic trainer

- > 1600 Change and Repair approvals since 2010 (MDOA from 2017 onwards)



2. Recent modifications “part 21-like process”

- HW MK51A/MK66 cockpit upgrade
- FA-18 Hornet MLU
- FA-18 major/minor repairs
- MD500 cockpit upgrade
- FDF Grob 115 E/EA upgrade
- Border Guard AB412EP and AW119mkII upgrade
- Multiple NH90 related modifications
- CC mods…
- etc.

2. Organization Approvals

Design Organization EASA.DOA.21J.410 2010->

European Aviation Safety Agency

APPROVAL CERTIFICATE

EASA.21J.410

Pursuant to Regulations (EC) 216/2008 and (EC) 1702/2003 and subject to the conditions specified below, the Agency hereby certifies

Patria Aviation Oy
Lentokonetehtaantie 2
FI-35600 Halli
Finland

as a DESIGN ORGANISATION

approved according to Part 21, Section A, Subpart J

CONDITIONS :

1. The approval is limited to that specified in the enclosed Terms of Approval, and
2. This approval requires compliance with the procedures specified in the Design Organisation Handbook, reference D-HDB, in the latest revision, and
3. This approval is valid whilst the approved Design Organisation remains in compliance with Part 21, Section A, Subpart J.
4. Subject to compliance with the foregoing conditions, this approval shall remain valid until surrendered or revoked.

For the European Aviation Safety Agency,

Date of issue: 2 July 2012

Roger SIMON
Design Organisation Manager

FIMAA approved Military Design Organization FIN.FIMAA.21J.0001 2017->

Finnish Military Aviation Authority

MILITARY DESIGN ORGANISATION APPROVAL CERTIFICATE

Number FIN.FIMAA.21J.0001

Pursuant to military aviation requirements and subject to the conditions specified below, the Finnish Military Aviation Authority hereby certifies:

PATRIA AVIATION OY

as a Military Design Organisation in compliance with SIO-To-LI-007 (FIN EMAR-21).

CONDITIONS:

1. This approval is limited to that specified in the enclosed Terms of Approval, and
2. This approval requires compliance with the procedures specified in the Design Organisation Exposition, reference MIL-DOA-HDB, in the latest revision, and
3. This approval is valid whilst the approved Military Design Organisation remains in compliance with SIO-To-LI-007 (FIN EMAR-21).
4. This approval shall remain valid for an unlimited duration unless the approval has previously been surrendered, superseded, suspended or revoked.

Director of Military Aviation Authority
Colonel

Kimmo Nortaja

Head of Airworthiness
M.Sc. (Eng.)

Kimmo Pelkonen

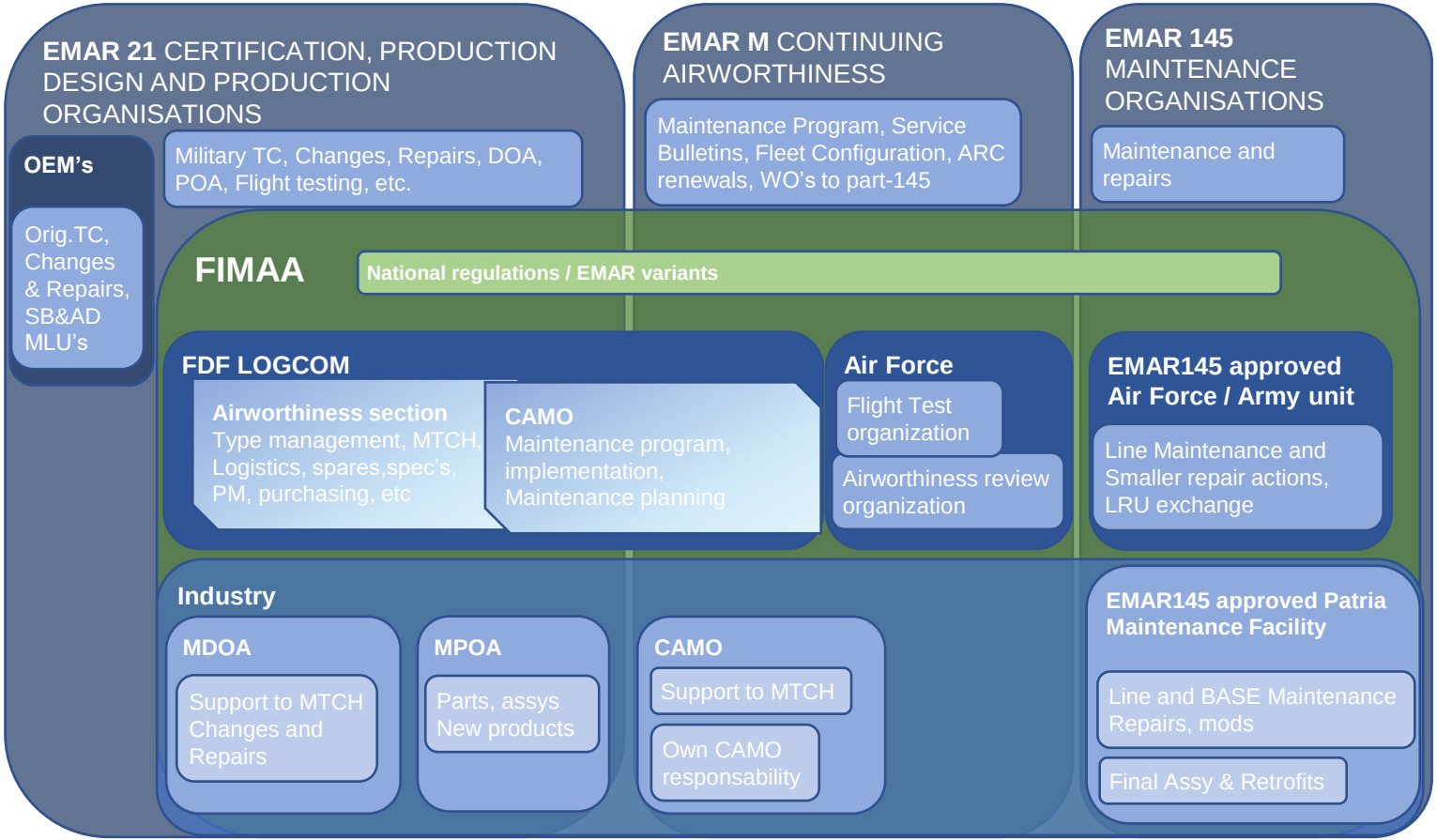
Date of original issue: 16 May 2017
Date of this revision: 16 May 2017
Revision No: 0

3. Status of EMAR implementation

Patria

- EMAR 21 (ed1.2) => SIM-To-Lt-035 effective since March 2019
  - Organisational approvals existing and in practical use (MPOA and MDOA)
- EMAR M (ed. 1.0) => SIM-To-Lt-036 effective since March 2019
  - Organisational approvals existing and in practical use
- EMAR 147 (ed. 1.1) => SIM-To-Lt-029 effective since May 2020
  - Organisational approvals existing and in practical use
- EMAR 66 (ed. 1.0) => SIM-To-Lt-029 effective since June 2021
  - Organizational approvals in transition period until -22
- EMAR 145 (ed. 1.1) => SIM-To-Lt-029 effective since June 2021
  - Organizational approvals in transition period until -22
- Other areas continue to be governed by national rules

3. Overview of AW responsibilities in FIMAA controlled environment



3. Considerations on EMAR implementation

Patria

- Well established and functioning base of traditional regulatory frame with national exceptions to Part 21 of today
  - Organizations built based on the existing national regulations
  - Widely adopted roles and responsibilities based on the existing national regulations
- Transitioning to EMAR based approved organizations and delegated privileges is a change, that does not happen overnight after publishing EMAR 21 based new rules
- Changes may extend from individual documents/forms to people careers and everything in between
- New elements may be required, such as Military STCs, ADs, CAMO activities
  - This may derive related questions requiring clarifications e.g. with legal obligations, commercial IPR's, applicability and transferability etc.
- Transition should be considered to take years instead of months to fully penetrate all areas of the airworthiness control system
- NOTE: industry may have had a head start with mandatory adoption of EASA Part 21 since as early as 2003 ((EC) No 1702/2003)
  - all industry procedures may not be directly applicable as EMAR21 ≠ EASA21 => National implementation
- Issues requiring special attention have been e.g.
  - Controlling and managing the prototype configuration in testing phase
  - Role of flight testing as a mean of compliance vs. acceptance testing and performance evaluation
  - Defining the flight conditions and test campaign content
  - Applying and issuing the approval / MSTC / Major
- NOTE: EMAR-proof procedure for managing Repairs has been found to require less changes and transition
- NOTE: Repair classification criteria and outcome (minor/major) has required adaptation in the national implementation

4. Key learning points and conclusions

Patria

- What has been intended as a clarification to the responsibilities and to reduce overlapping activities, may on the contrary increase these, if EMAR transition is only partially implemented

- Partial transition may result into overlapping work by e.g.
  - Need to prepare documentation/evidence to satisfy two systems: national and EMAR based
  - Need to satisfy dual configuration management
  - Overlapping and partially duplicate inspection burden
  - Overlapping and partially duplicate control of conformity and test readiness
  - Ambiguous applicant/approval holder status

- For EMAR set-up to function, the
  - Privileges should be acknowledged and exercised by all involved parties
  - Roles should be clearly defined for each function and overlapping activities minimized
    (MDOA, MPOA, -145 and Authority, CAMO the party performing Aircraft Airworthiness Certificate reviews and quality controls and acceptance testing)

4. Key learning points and conclusions

EMAR's are welcomed by the industry and are seen to provide clarity, efficiency and safety benefits through better defined interfaces and reduced duplicate effort

Implementing EMAR's impacts the role's and responsibilities between: MAA, Operator, industry partner which should be recognized also on contractual level

Granting an approval to an organization fundamentally means delegating trust and authority i.e. *privileges*. Focus of oversight should be adjusted accordingly and freedom of operation allowed with minimal boundaries to daily work

Savings (time&money) may be obtained from clarifying and separating the AW process/oversight between an operational approved product and a prototype installation for compliance showing with specific conditions (PtF) => risk based approach, industry config. mngt.

In the future, the applicability issues between fleets of different nations should be addressed

- Defining "applicability" similarly to CIV TCDS is not easily accomplished

Use of Military STC's should be clarified in terms of: applicability, configuration management, changes to the STC, occurrence reporting, etc.

Best practices on how to manage bulletins and AD-like mandatory instruments should be discussed
- both within nation AND across borders

4. Key learning points and conclusions

Patria

Especially with ed. 2.0 to EMAR 21 and the introduction of LOI (level of involvement) concept, we would encourage:

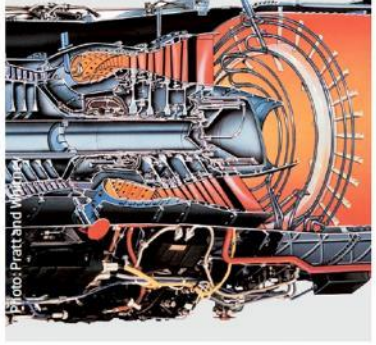
- to find best ways to utilize the large accumulated pool of civil aviation experience
  - Classification criteria's, novel features, means of compliance and adequate compliance evidence, etc.

- to consider alternative sources for technical and certification expertise
  e.g. EDA coordinated resource pooling between nations/MAAs, pooling with civil authority personnel, utilizing industries as independent certification experts?

- To generate, adopt or recognize as much AMC/GM/AC material as possible

In addition,

- EMACC and EMAD 20 are seen as excellent, but not exhaustive documents in all accounts
- Especially, the military specific technical disciplines having no civil regulatory counterpart, should be addressed either via EDA or nationally. Optimally, the guidance and the accumulated certification experience could be compiled to benefit European industry and allow commonality between nations (ejection seats, EW, Self protection, weapons systems, stealth, mission survivability, etc.)



Patria

When if is not an option.