



MILITARY AIRWORTHINESS CONFERENCE



8 & 9 October
The Hague, The Netherlands

Hosted by



#MAC25

Conference Agenda

- **Mission first, Safety always, EMARs forever!**
- *How to deal with crisis, new technologies and the future?*



Day 1 - 8th October 2025

08:00 - 08:30	Registration and Coffee
08:30 - 09:00	Welcome Address and Keynote Speech – NL Minister of <u>Defense</u>
09:00 - 09:20	Scene Setting Speech – EDA Chief Executive
09:20 - 09:45	Introduction of Conference and Report from the Military Airworthiness Authorities Forum – NL director MAA and MAWA Forum Chair

Session 1

Airworthiness in times of Crisis

09:45 - 10:00	Presentation of EMAD 4 AW in Crisis – MAWA Chair
10:00 - 10:30	Airworthiness Lessons Learned on the Battlefield - Ukraine Deputy Minister
10:30 - 11:00	Risk based Assessment – UK MAA Commodore Neil MATHIESON
11:00 - 11:30	WESL (Wartime Essential System List): Beyond the MMEL limitations– Airbus <u>Defense</u> and Space. <u>mt</u> Sergio Morales Rodero
11:30 - 12:00	Coffee Break
12:00 - 12:30	Panel Discussion
12:30 - 12:40	Conference Group Photograph
12:40 - 14:00	Lunch



Session 2

World Wide Cooperation Opportunities

14:00 - 14:05	Presentations from worldwide partners
14:05 - 14:30	Indian Military Airworthiness Framework & Mutual Co-operation - Mr. APVS Prasad, Chief Executive (Airworthiness)
14:30 - 14:55	Risk Management and the Canadian Military Airworthiness Program - Martin Breton, Director Technical Airworthiness and Engineering Support (DTAES)
14:55 - 15:20	UAE MAA introduction, current situation and future challenges - Colonel Staff Eng. Faris Naser Alsubaihi, Head of UAE Military Airworthiness Authority
15:20 - 15:45	Military Airworthiness as a Strategic Capability for Colombia - Major Mauricio López Gómez, State Aviation Airworthiness Authority – AAAES
15:45 - 16:15	Coffee break
16:15 - 16:45	Panel Discussion
16:45 - 17:00	Summary
17:30 - 20:00	Informal Networking Event for all registered Attendees

Day 2 - 9th October 2025

Session 3
Interoperability - EMARs forever

08:30 - 09:00	Welcome and Coffee
<u>09:00 - 09:25</u>	<u>Aircraft Cross Servicing</u> & <u>Aircraft Cross Maintenance from a EMAR-Perspective</u> – Col Christian Lörch LufABw, GAF, DE MAA
0925 – <u>09:50</u>	<u>Leveraging recognition for maintenance organisation approval</u> – Colonel ItAF Giorgio BORGHI, IT DAAA
09:50 - 10:15	Feedback on the issuance of an EMAR 145 approval to an organisation located outside the EU– Michael Fella, Director of Depot Operations & EMAR/FR 145 Workshop Manager for GA-ASI and colonel Thierry Schuster, deputy airworthiness director DSAE
10:15 - 10:45	Panel Discussion
10:45 - 11:15	Coffee break

Session 4

Challenges for the future

11:15 - 11:40	Civilian Airworthiness Outlook – Alain LEROY, chief engineer EASA
11:40 - 12:05	UAS way ahead – Ross McKenzie, NATO and Joao Caetano, EDA,
12:05 - 12:30	Certification challenges in a changing world – Professor Arjan de Jong, NLR
12:30 - 12:55	Additive Manufacturing – Kees Temminck, NL Airforce and Maarten van <u>Ramshorst, Aeronamic</u>
12:55 - 13:20	Panel Discussion

Conference Summary & Outcomes

13:20 - 13:30	Closing Remarks
13:30 - 14:30	Lunch



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MAWA Achievements (ARAG, CAWAG and DPAG), since November 2023

Integration of Management System requirements (SMS) in:

- EMAR 145 Ed. 2.0 & associated AMC/GM
- EMAR CAMO Ed. 1.0 & associated AMC/GM

Update/creation of following EMARs - AMC/GMs - EMADs

- EMAR 145 Ed. 2.0 (05 Nov 24)
- AMC/GM to EMAR 145 Ed. 2.0 (27 May 25)
- AMC/GM to EMAR CAMO Ed. 1.0 (17 Oct 23)
- EMAR M Ed. 2.1 (05 Nov 24)
- AMC/GM to EMAR M Ed. 2.0 (18 Apr 24)
- EMAD R Ed. 3.2 (27 May 25): update of Implementing Arrangements
- EMAD 1 Ed. 1.5 (27 May 25): on Acronyms & Definitions
- EMAD 2 Ed. 1.0 (27 May 25): **NEW** *“Writing Guide for NMAA Exposition”*
- EMAD 20 Ed. 2.1 (18 Apr 24): update of EMAD 20-20
- EMAD OSD Ed. 1.0 (27 May 25)
- EMAR 21 Ed. 3.0 (27 May 25)
- EMAR 21 AMC & GM Ed. 3.0 (7 October 25)

Development of new EMAD 4 Ed. 1.0 on *“Military Airworthiness in times of crisis”*

- Involving ARAG & DPAG & CAWAG
- 1st Draft approved by MAWA F52 (on 07 Oct 25) to initiate Consultation phase with pMS

Outlook and work in progress

Development of military Aw requirements adapted to certified UAS (Specific cat of Ops)

- Initial/Continued Aw => **update of EMAR 21 to include UAS**
- Continuing Aw => **creation of 3 new EMARS:**
 - **EMAR ML.UAS** => Continuing Aw requirements
 - **EMAR CAO.UAS** => requirements for combined CAMO & MO organisation
 - **EMAR AR.UAS** => NMAA requirements (Section B)

Update of **EMAR 66 Ed. 2.0** & associated **AMC/GM**

Update of **EMAR 147 Ed. 2.0** & associated **AMC/GM**

Update the **EMACC**

Start EMAR Training (CAT A)



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Airworthiness in times of crisis - SCOPE

- The European Military Airworthiness Requirements (EMARs) should **remain unchanged**, even in times of crisis.
- Declaring a state of crisis for Airworthiness (AW) is a national **sovereign decision**.
- The goal is to optimize the availability and sustainability of military aircraft support systems by offering various options to ensure continuity. This involves detailing how to **temporarily derogate** from peacetime EMARs, providing increased flexibility in such situations.
- It is crucial to prepare as much as possible **before a crisis** arises.
- Additionally, guidance should be provided on how to revert to **full EMAR compliance environment** once the crisis has passed.

DEFINITIONS

Crucial

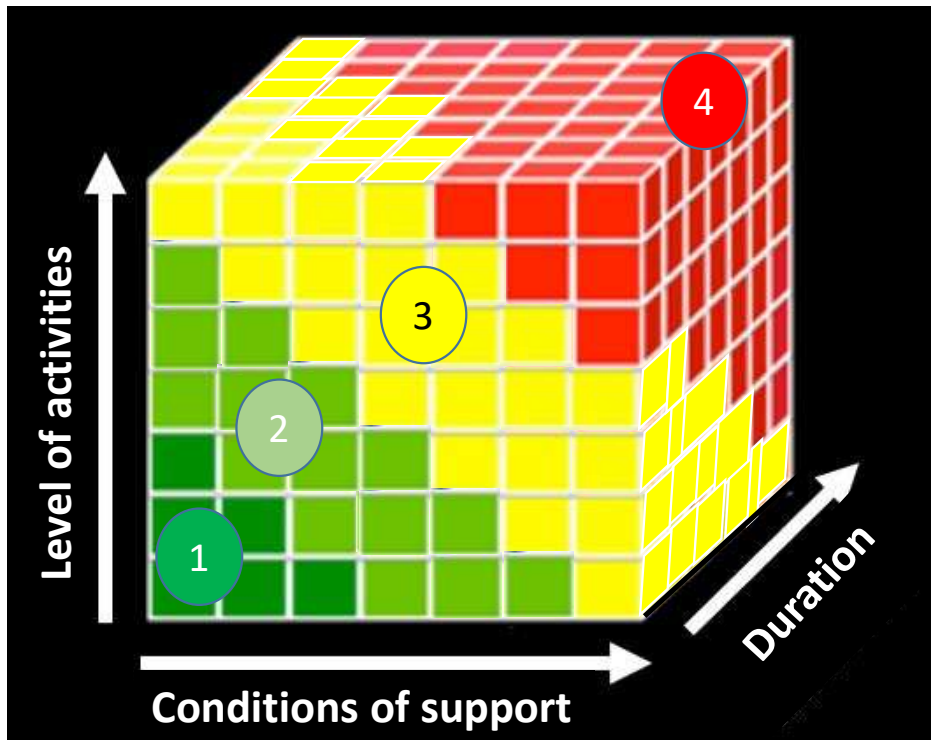
- Failure to make a crucial requirement will have a definite impact on safety

Important

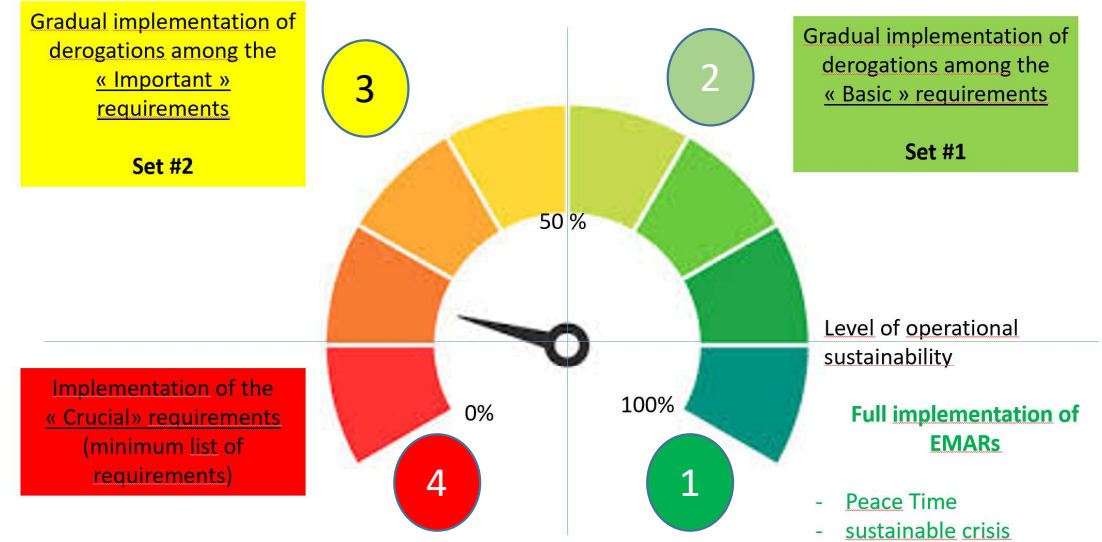
- Failure to make an important requirement will have a possible strong impact or short term impact on safety

Basic

- Failure to make a basic requirement will have a possible impact on safety



Airworthiness in Crisis



Level of activities = from low to strong

Duration = How long will last the crisis, from short to long

Conditions of support = How are the conditions for providing support, from good to very degraded

EMAD 4 - Airworthiness in times of crisis



EUROPEAN MILITARY AIRWORTHINESS DOCUMENT

EMAD 4

Airworthiness in times of crisis

Edition Number	1.0
Edition Date	10 September 2025
Status	Draft



MILITARY AIRWORTHINESS
AUTHORITIES FORUM

ARAG

Structure, introduction
and Annex 3

Structure and introduction proposed by ARAG. The content of Annex 3 was based on DSAE and LufABw Food for Thought Papers about Airworthiness in times of crisis and inputs from CAWAG and DPAG.

DPAG

Annex 1

The starting point was the original EMAR 21 processes for changes, repairs, manuals and permit to fly. Brainstorming, discussions and fishbone diagrams were used to capture the issues and potential guidelines to overcome them in times of crisis.

CAWAG

Annex 2

The starting point was the EMAR CAMO, M and 145 requirements organized in tables. Three set of derogations were defined basic, important and crucial. Those were marked in bold in the original/slightly changed requirements.

Way ahead for EMAD 4

- EMAD 4 now under consultation, please have a last close look?
- Ready for publication beginning of April.
- This is not the end, but the start!
- Close coordination between NMAA's and Ops Commands is needed.
- Implementation is key!



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Airworthiness LESSONS LEARNED



**DEPUTY MOD OF UKRAINE
MR. OLEKSANDR KOZENKO**



Hague, 2025



System overview



- + The Air Code of Ukraine is the legal instrument regulating all matters related to the functioning of aviation in the Ukrainian Air Space.
- + The Ministry of Defense of Ukraine is entrusted with regulating the activity of state aviation* through the Ukrainian Military Aviation Authority.
- + Given that UAF fleet comprises two categories of aircraft (in terms of design and production organization oversight) Ukraine has implemented a two-fold system of maintaining airworthiness.



***State Aviation of Ukraine** includes aviation of the Armed Forces of Ukraine, Defense Intelligence, Security Service of Ukraine, National Guard of Ukraine State Border Guard Service of Ukraine, National Police of Ukraine and the State Emergency Service of Ukraine.



System overview



For Aircraft NOT subject to oversight

and not having Type Certificate Holder Organizations Ukrainian legislation envisages a special mechanism implemented by the following entities:

- + Controlling body
- + Research and Development organizations that provide expert assessment
- + Companies and manufacturing facilities involved in the maintenance of the aircraft
- + End user organizations

For Aircraft subject to oversight

Ukraine implemented the following European Military Airworthiness Requirements that govern airworthiness and are compatible with EASA and interoperable with MAWA forum countries:

- + EMAR 21 – Initial Aircraft Certification
- + EMAR M and CAMO – Continuing Airworthiness Mngt
- + EMAR 145 – Aircraft Maintenance
- + EMAR 147 – Maintenance Training Organizations
- + EMAR 66 – Aircraft Maintenance Licensing



OVERARCHING ISSUES



The overarching issues related to airworthiness management are rooted in the need to simultaneously utilize both systems.

There is also a lack of knowledge and experience in employing the European Procedures in the operation of the Aviation of the Armed Forces of Ukraine (Navy Land Force, Army).

Lack of English language skills in personnel of both the end-user organizations and the companies that could possibly be involved in maintaining airworthiness of the aircraft.





FACTORS IMPACTING AIRWORTHINESS



For Aircraft NOT subject to oversight

- 1)** Lack of access to the facilities of and inability to contact the original manufacturer of the equipment;
- 2)** Complications related to the supply/production of spare parts , elements, consumables, etc. that are required for aircraft maintenance purposes;
- 3)** Obsolete technical documentation (all available technical documentation published pre 2014).

For Aircraft subject to oversight

- 1)** Lack of a sufficient number of MTCHO, CAMO, AMO, AMTP to support and maintain airworthiness;
- 2)** Complications related to the procurement of spare parts, replaceable elements, and consumables (related to the requirements to use Prozoro government tender e-catalog for acquisitions);
- 3)** The ability to achieve full operational capability in terms of aircraft maintenance only within 3 years time at the earliest.



ISSUES



For Aircraft subject to oversight

Airworthiness management depends on the existence of MTCHO, CAMO, AMO

Long lead-up times and complicated logistics for spare parts & consumables

Lack of local companies certified to conduct aircraft maintenance

Long time required for Ukraine to stand up an independent airworthiness management capability in a closed-loop system



ISSUES



For Aircraft not subject to oversight

Most aircraft approaching the end of their life cycle or having it extended beyond

Most spare parts are cannibalized from damaged aircraft not subject to repair

Many repair facilities, industrial facilities and equipment for MRO being damaged/destroyed

Need to rapidly integrate and field both offensive and defensive capability improvement assets with min intervention





Support requests



Ukraine needs support to help stand up and establish the lacking organizations involved in managing and maintaining airworthiness, as well as support to develop and implement a legal framework to manage the operations and sustainment of donated platforms.

At the same time, to transform we need to survive

and for that Ukraine needs support in restoring damaged airfield infrastructure, increasing combat capabilities of existing fleet and expanding the existing MRO capabilities.



THANK YOU FOR YOUR
ATTENTION!



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Managing Risk In Peace and Conflict – UK Approaches

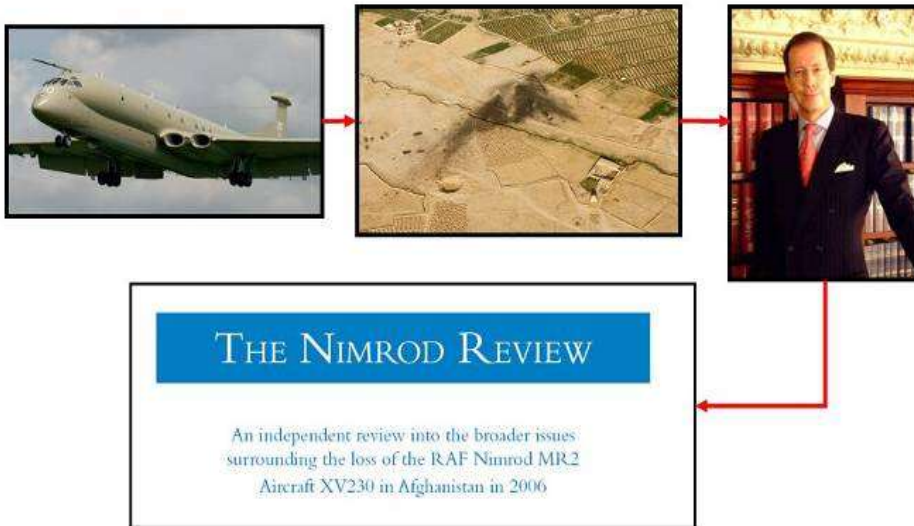
Commodore Neil Mathieson Royal Navy
Head of Regulation and Certification
UK Military Aviation Authority



Scope

- Lessons From The Past
- The Current Challenge
- Understanding, Managing and Owning Risk
- How Regulation Relates to Risk
- Managing Outcomes/Identifying Risk
- Developments in Uncrewed Air Systems Regulation
- Future Regulatory Considerations

Lessons From The Past



“The shortcomings in the current airworthiness system in the MoD are manifold and include:

- (1) A failure to adhere to basic Principles;*
- (2) A Military Airworthiness System that is not fit for purpose;*
- (3) A Safety Case regime which is ineffective and wasteful;*
- (4) An inadequate appreciation of the needs of Aged Aircraft;*
- (5) A series of weakness in areas of Personnel;*
- (6) An unsatisfactory relationship between the MoD and Industry;*
- (7) An unacceptable Procurement process leading to serial delays and cost-overruns; and*
- (8) A Safety Culture that has allowed “business” to eclipse Airworthiness”*

The Current Challenge

- Strategic Context
- Procurement
- Innovation
- Technology
- Rapid development
- Risk appetite

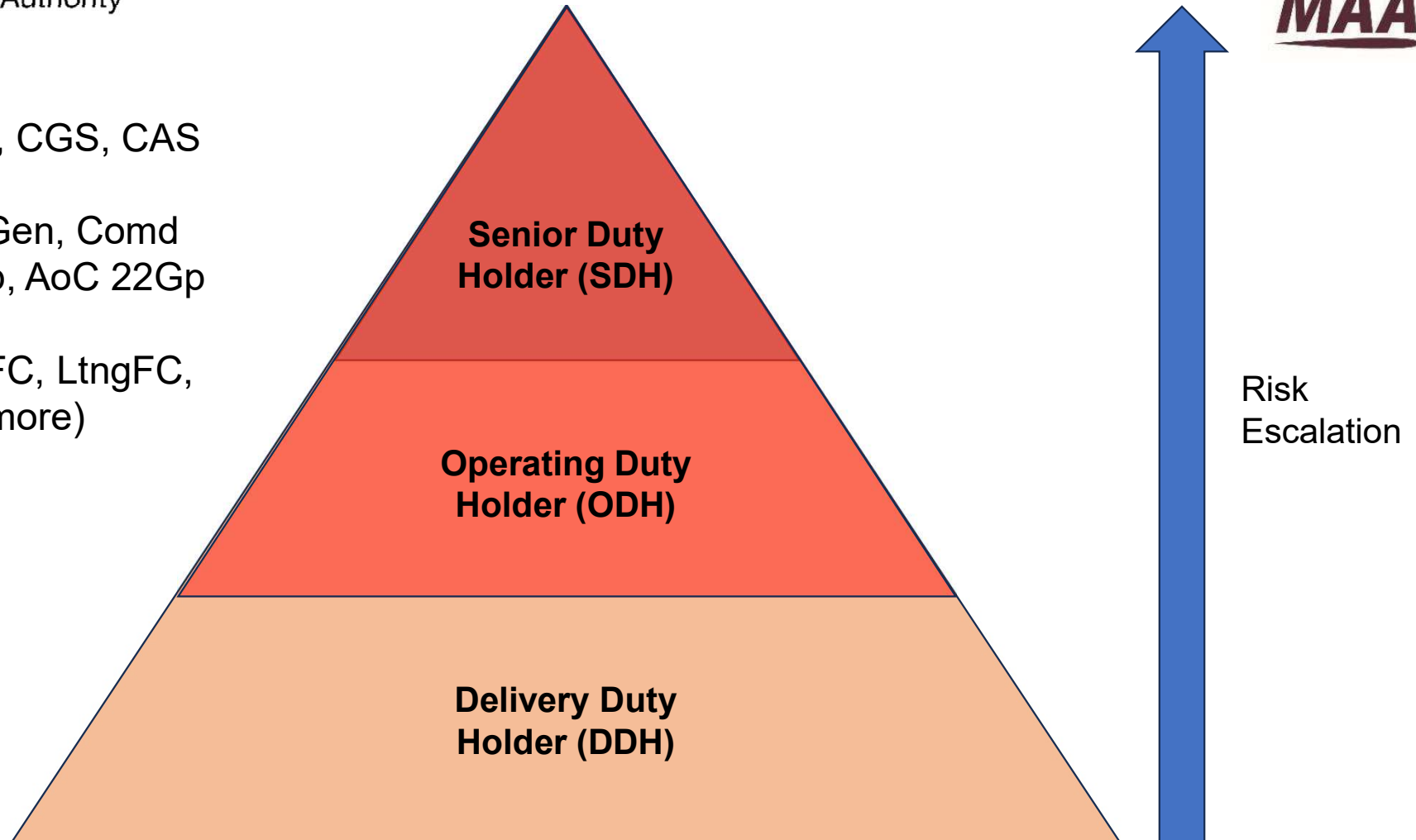


Managing Risk

- What risk?
- Probabilities?
- Outcomes?
- Context Context Context!!!!
- Whose risk?



- **SDH** – 4* 1SL, CGS, CAS
- **ODH** – 2* DFGGen, Comd JAC, AoC 1Gp, AoC 22Gp
- **DDH** – O6 TyFC, LtngFC, ChFC (many more)



Ownership of Risk – Duty Holders

RA 1020 Regulation

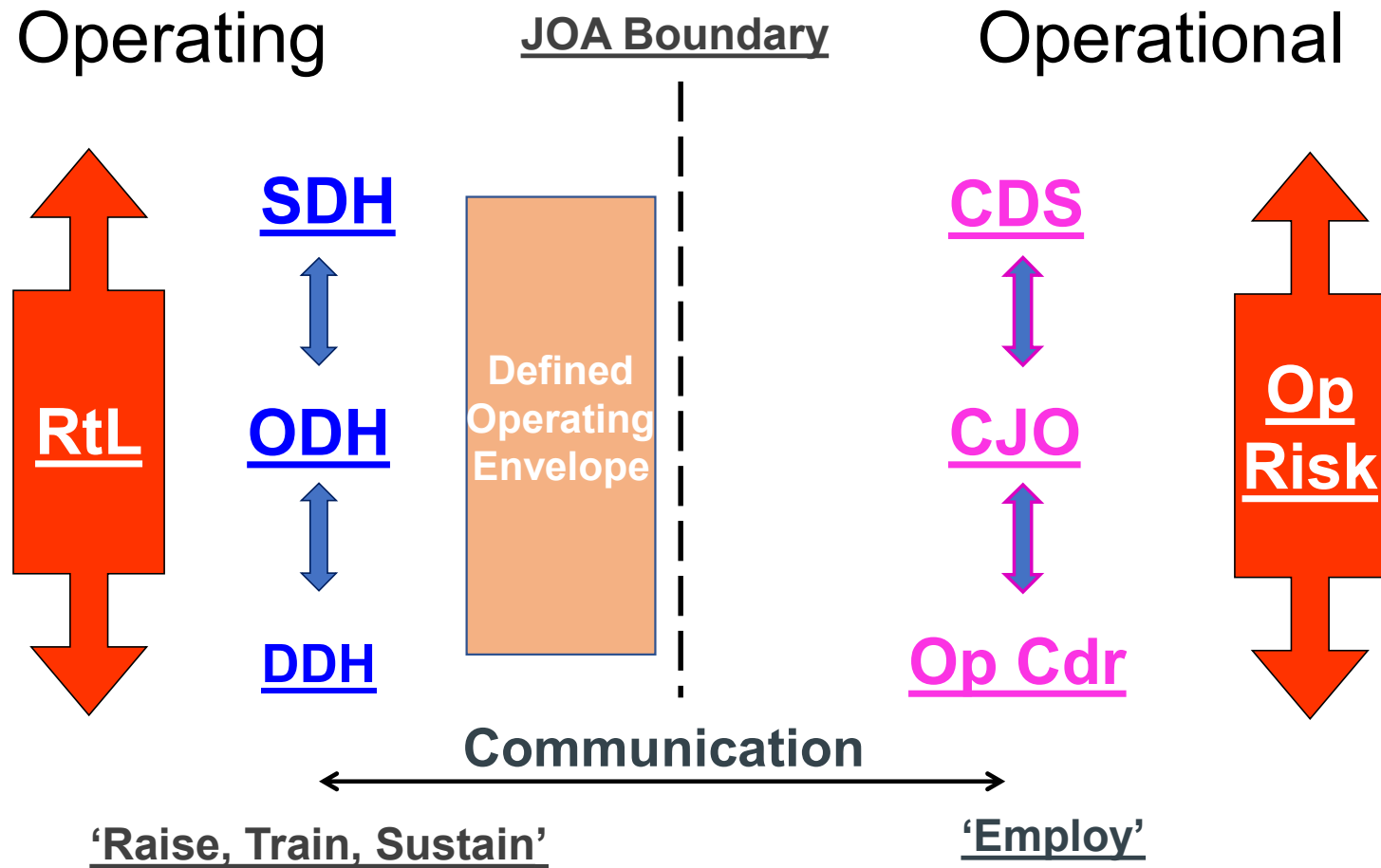
Aviation Duty Holders (ADHs) **shall** actively manage Air Safety for each Air System within their Area of Responsibility (AoR) via an Air System Safety Case (ASSC) which is managed by an Air Safety Management System (ASMS), to ensure that RtL is **As Low As Reasonably Practicable (ALARP)** and **Tolerable**.

RA 1020 (1) Acceptable Means of Compliance

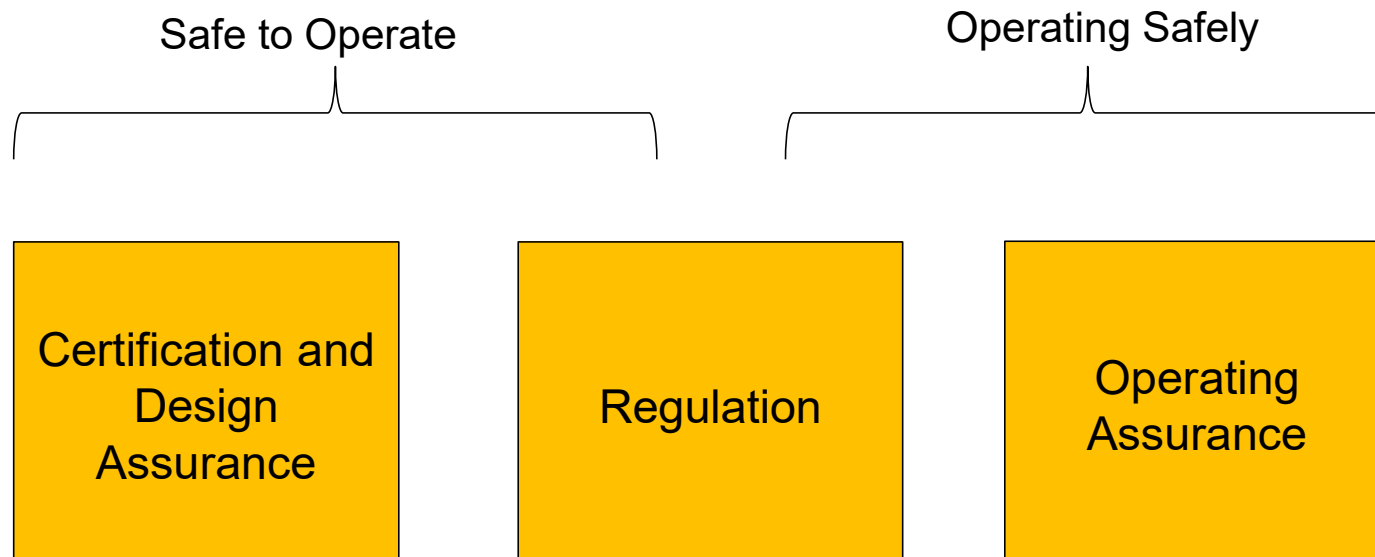
1. ADHs are legally accountable for the safe operation, Continuing Airworthiness and Maintenance of systems in their AoR and for ensuring that RtL is **ALARP** and **Tolerable**. They should:
 - a. Cease routine aviation operations if RtL are identified that are not demonstrably **ALARP** and **Tolerable**.
 - b. Establish and maintain an effective ASMS that, wherever possible, exploits the MOD's existing aviation regulatory structures, publications and management practices, to demonstrate an acceptable means of compliance with the requirements in RA 1200.

Operational Commander Responsibilities – RA1020(1) Guidance Material Para 17

“Operational Imperative to exceed the Operating Envelope. The limit of an an ADH’s Responsibility and Accountability for managing operating RtL in the operational domain is defined at the point at which an Operational Commander directs any relevant activity (operating and / or support) that transcends the operating boundary set by the ADH. In doing so, the Operational Commander will be prepared to justify their actions in retrospect, preferably via a context based auditable Risk analysis”



How Regulation Relates To Risk



UK MAA Regulatory Publications

Managing Outcomes/Identifying Risk

- Special Clearances
 - Clearance with Limited Evidence
 - Operational Emergency Clearance
- Alternative Courses of Action
- Alternative Means of Compliance
- Waivers
- Exemptions
- Operational Imperatives



UK OFFICIAL



Defence Safety Authority



Ministry
of Defence

Defence Drone Strategy

The UK's Approach to Defence Uncrewed Systems

Royal Air Force

Autonomous Collaborative Platform Strategy



ROYAL
AIR FORCE



Military Aviation Authority
MAA



Uncrewed Ambitions



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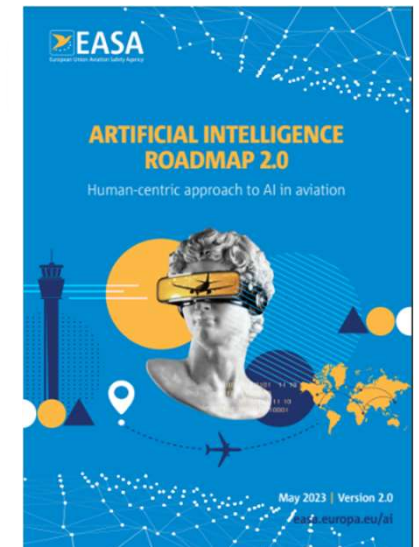
Enabling Innovation – Enhancing Uncrewed Regulation

- Proportionate, Agile, at Pace and Safe (Enough)
 - Enabling rapid fielding of operational capability
 - Enabling fielding of novel technology
- Military Regulation that is broadly fit-for-purpose
 - Updated Regs, definitions and ease of access
 - Alignment with CAA. Moving ahead where possible
 - Application of SORA (Containment Arguments)
- Challenges
 - Building SQEP in personnel
 - Early engagement
 - Industry access to T&E facilities
 - BVLOS
 - Congested Airspace



Future Considerations

- Risk thresholds
- Programme Delivery
- Regulatory Compliance
- Communication
- Innovation
- Emerging Technologies
- SQEP shortage
- Use of Recognition



Thank you
for your attention



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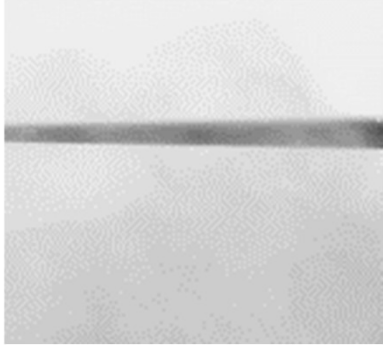
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ABDR and WESL: manuals for wartime

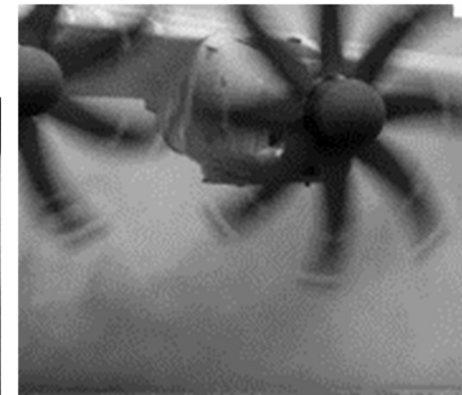
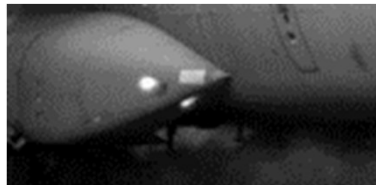
Amaia Castelló, Sergio Morales Roderó, and Amélie Ruau
Airbus Defence and Space

DEFENCE AND SPACE

AIRBUS



ABDR



AGENDA - ABDR

1.- Purpose of the ABDR

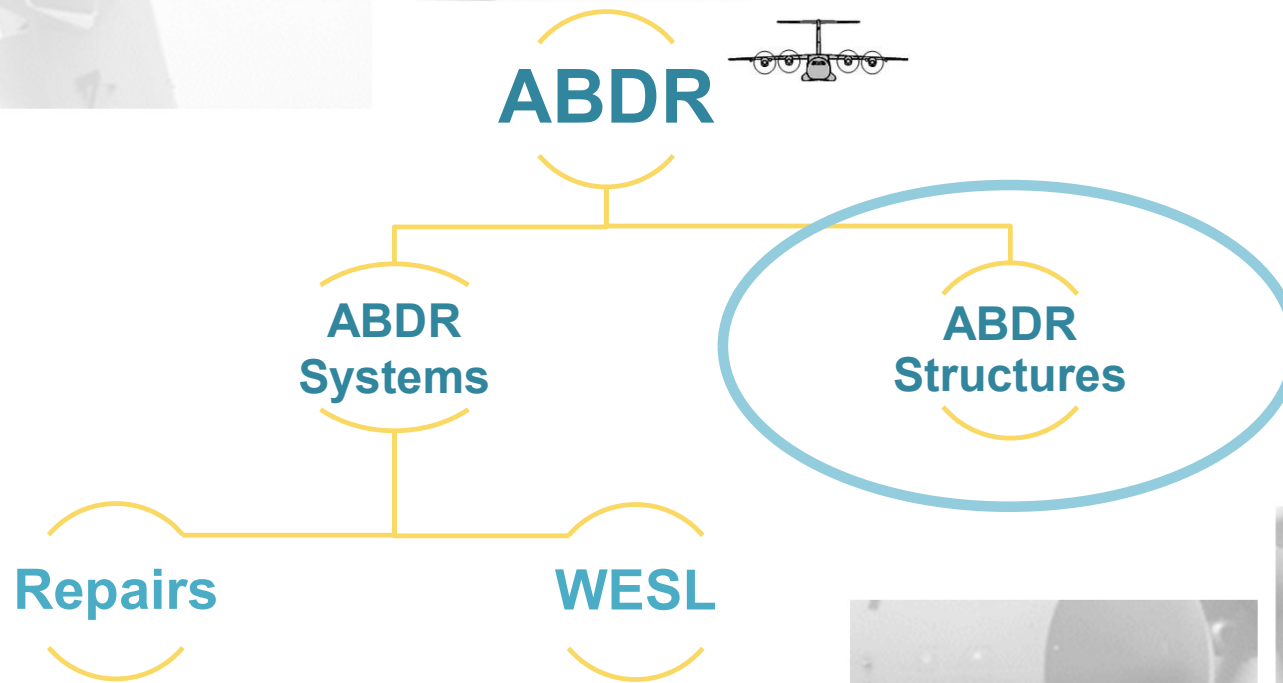
2.- ABDR Structures

3.- ABDR Structures Examples

4.- TID Manuals with ADL/RDL or useful information
for damages Systems

5.- TID Manuals with ADL/RDL or useful information
for damages Systems
use

ABDR Manuals - General Presentation



Purpose of the ABDR

ABDR stands for **Aircraft Battle Damage Repair Manual**.

The ABDR manual provides guidance for **simplifying maintenance and repairs** in a wartime condition, reducing the time needed for enabling the A/C dispatch following a battle damage.

The dispatch to be performed is an Extraction (Ferry) Flight (2FC/6FH) or Short mission deployment (28FC/100FH) with possible limitations in speed and ceiling.

The main goal is to operate the A/C with a minimum of acceptable level of safety; to save the crew and to transfer the A/C to a secure base.

ABDR is not subject to Airworthiness Approval.

The liability of the dispatch belongs to the Commander and/or the relevant national operational authority.

ABDR Structures

The ABDR Structures allows aircraft flight with a **certain level of unrepaired damage** or **performing quick and simplified repairs**.

The manual contains technical data that is helpful to resume operation after suffering battle damage, thus **increasing its operability** by reducing the standard safety margins established in the certification basis.

Type of Damages to be addressed by ABDR Structures are in line with the type of damages addressed by ASR:

- Skin cracks.
- Piercing bullet damage.
- Damage other than a single circular hole (dents, scratches, delaminations, multiple perforations, etc): In general the stress justification for the piercing bullet damage shall target when possible to cover any damage which is included in a circle with a diameter of 125 mm.

ABDR Structures

Structure classification:

Category A: Structures identified as Principal Structural Elements (PSE). These are elements that contribute significantly to carry flight, ground or pressurization loads and whose failure can result in **catastrophic failure** of the aircraft.

Category B: Structures whose failure or detachment can indirectly compromise continued safe flight or landing by and adverse effect on Category A structure.

- Structures whose failure can significantly change the static or dynamic loading on a Category A structure.
- Structures which if released from the aircraft can cause a potential catastrophic impact with a Category A structure.

Category C: This includes structures whose failure or detachment **will not compromise continued safe flight** or landing but where the potentially large size of released elements need to be considered.

Category D: These are structures whose failure or detachment has no airworthiness but only an **economic impact**.

Type of damages:

ALLOWABLE DAMAGE (AD). Damages within a limit that does not impose operational restrictions on the aircraft if structural repair is not done.

ALLOWABLE DAMAGE WITH OPERATIONAL RESTRICTIONS (RD). Damages that produce the appliance of limitations if they are not repaired. The purpose of this damage type is to make possible ferry flight missions when time to repair is an operationally critical factor.

NOT ALLOWABLE DAMAGE (NR). Damages outside limits. They need to be repaired and no partial limitations are allowed.

ABDR EXAMPLES

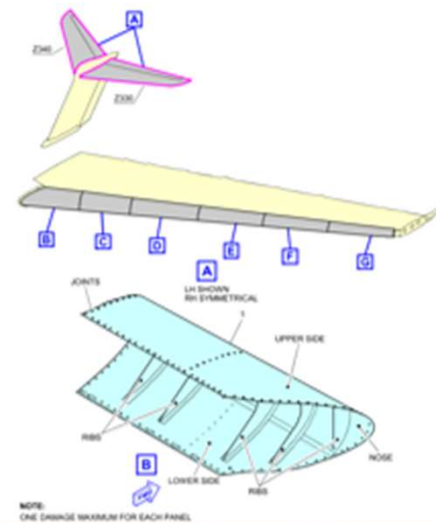
• Air Intake Cowls – Category C

NOTE: A maximum of one damage for each panel is permitted.

ITEM	NOMENCLATURE	MATERIAL	CAT.	DAMAGE LIMITATIONS AND RESTRICTIONS	ACTION OR REPAIR
Fig. 1 Item 1	UPPER INTAKE COWL	Composite	C	[AD] FF and RTM: - Area < 43239 mm ² (67.02 in ²) - L < 213 mm (8.39 in). Damage can be found in the core zone.	If open holes have a diameter less than or equal to 50 mm (1.97 in), use high speed tape (Material 08-052) to restore the aerodynamic profile. If open holes have a diameter of more than 50 mm (1.97 in), use an aerodynamic patch.
Fig. 1 Item 2	REAR INTAKE COWL	Composite	C	[AD] FF and RTM: No damage is permitted.	No further action.
Fig. 1 Item 3	LOWER INTAKE COWL	Composite	C	[AD] FF and RTM: - Area < 36300 mm ² (56.26 in ²) - L < 220 mm (8.66 in). Damage can be found in the core zone.	If open holes have a diameter less than or equal to 50 mm (1.97 in), use high speed tape (Material 08-052) to restore the aerodynamic profile. If open holes have a diameter of more than 50 mm (1.97 in), use an aerodynamic patch.
Fig. 1 Item 4	PGB ACCESS PANELS 413AL 423AL 433AL 443AL	Composite	C	[AD] FF and RTM: - Area < 55647 mm ² (86.25 in ²) - L < 243 mm (9.57 in). Damage can be found in the core zone.	If open holes have a diameter less than or equal to 50 mm (1.97 in), use high speed tape (Material 08-052) to restore the aerodynamic profile. If open holes have a diameter of more than 50 mm (1.97 in), use an aerodynamic patch.

ABDR STRUCTURES EXAMPLES

• HTP LE Panels – Category C

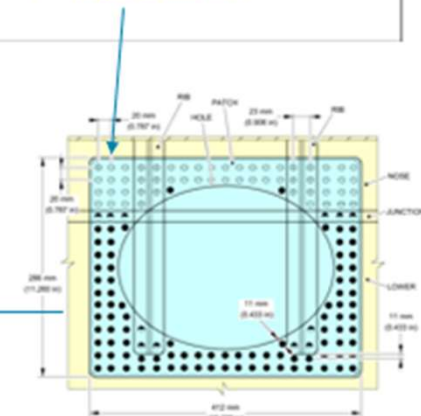


NOTE: A maximum of one damage for each panel is permitted.

ITEM	NOMENCLATURE	MATERIAL	CAT.	DAMAGE LIMITATIONS AND RESTRICTIONS	ACTION OR REPAIR
Fig. 1 Sheet 1 Item 1	HORIZONTAL TAIL PLANE (HTP) LEADING EDGE PANEL 1 (UPPER AND LOWER SIDE)	RTM-Composite	C	[AD] FF: - $L \leq 325$ mm (12.80 in) - $r/a \leq 0.3$ - $a/H \leq 0.4$ The maximum dimension of the open hole is 200x325 mm (7.87x12.80 in). The maximum dimension of the open hole in the chord direction is 200 mm (7.87 in). RTM: - $L \leq 150$ mm (5.91 in) - $r/a \leq 0.3$ - $a/H \leq 0.4$ The maximum dimension of the open hole is 150x70 mm (5.91x2.76 in).	If the hole is less than or equal to 50 mm (1.97 in), use high speed tape (Material 05-005) to restore the aerodynamic profile. If the hole is more than 50 mm (1.97 in), use an aerodynamic patch.
				[RD] RTM: - $L \leq 325$ mm (12.80 in). The maximum dimension of the open hole is 200x325 mm (7.87x12.80 in). The maximum dimension of the open hole in the chord direction is 200 mm (7.87 in).	Do the Trimmable Horizontal Stabilizer (THS) leading edge repair procedure (Ref. AJA-00-90-55-22727-6857 A).

Damage with dimensions of 200x325 mm out of the scope of ASR. Only up to 150 mm

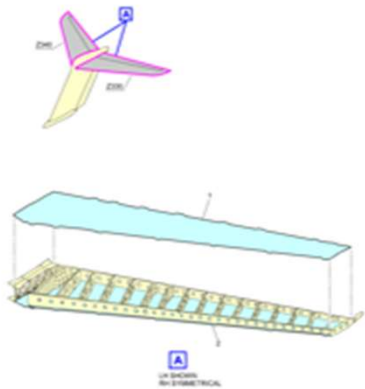
ASR



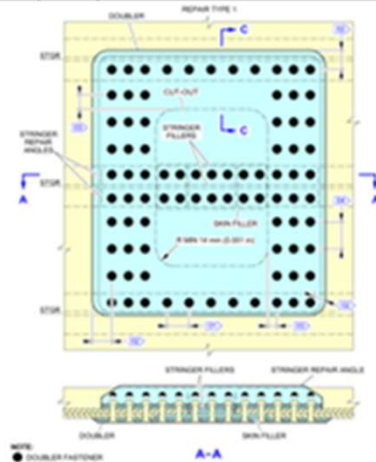
• AIRBUS 05-005
 • AIRBUS 05-005

ABDR EXAMPLES

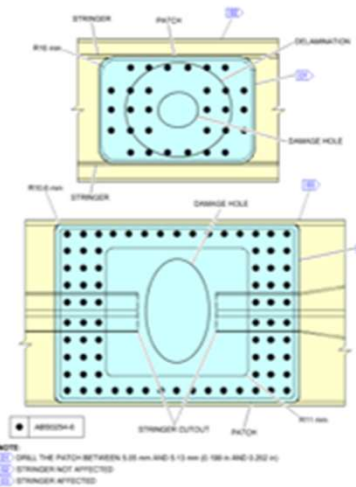
• HTP Spar Box – Skin Panels – Category A



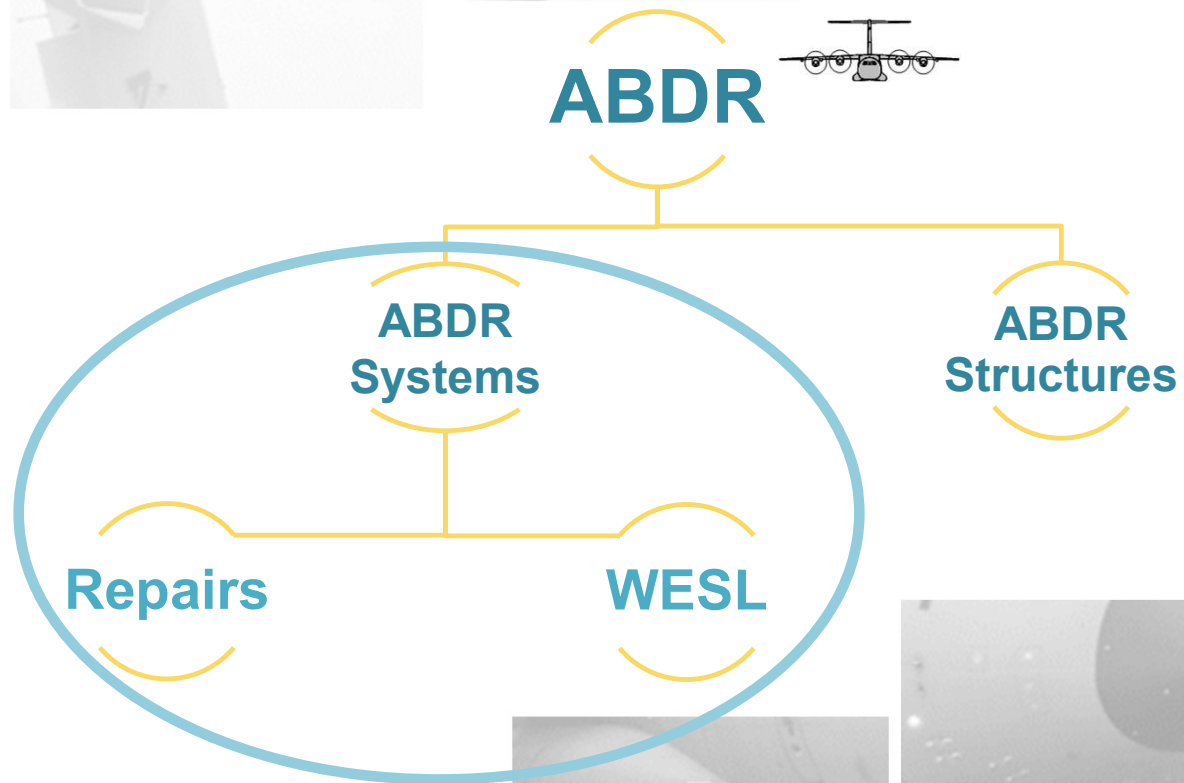
ITEM	NOMENCLATURE	MATERIAL	CAT.	DAMAGE LIMITATIONS AND RESTRICTIONS	ACTION OR REPAIR
Fig. 1 Tab. 1	HORIZONTAL TAIL PLANE (HTP) UPPER SKIN	Composite	A	[AD] FP: - L < 400 mm (15.75 in) and a maximum of one stringer is damaged. - The maximum dimension of the hole must be 200x250 mm (7.87x9.84 in). - See remarks: - <1> - <2> - <3> - <4> RTM: - L < 250 mm (9.84 in) and no stringer is damaged. - See remarks: - <1> - <2> - <3> - <4>	If the hole is less than or equal to 50 mm (1.97 in), use high speed tape (Material 05.000) to restore the aerodynamic profile. If the hole is more than 50 mm (1.97 in), use an aerodynamic patch.
				[RD] RTM: - L < 400 mm (15.75 in) and a maximum of one stringer is damaged. - The maximum dimension of the hole must be 200x250 mm (7.87x9.84 in). - See remarks: - <1> - <2> - <3> - <4>	Do the THS leading-edge repair procedure (Ref. A/A.00.00.05.21ZZ.6052.A).



ASR



ABDR Manuals - General Presentation



ABDR Systems

ABDR Systems repairs will be **standard repairs**, based on existing documentation (e.g. DFPRM).

While the permanent repairs are developed for the DFPRM, it is proposed to generate corresponding temporary repairs that will be used exclusively in ABDR. The content of these temporary repairs must be validated by DO in ABDR specific context considerations.

Type of Damages to be addressed by ABDR System will be the same as DFPRM:

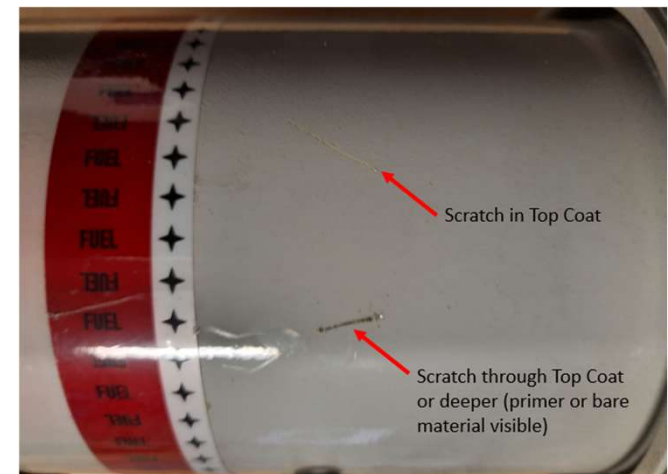
- For metallic components includes scratch, crack, hole and dent.
- For composites will be scratch, stress whitening, crack and breakthrough with cut of fibers..



Cracked fuel pipe

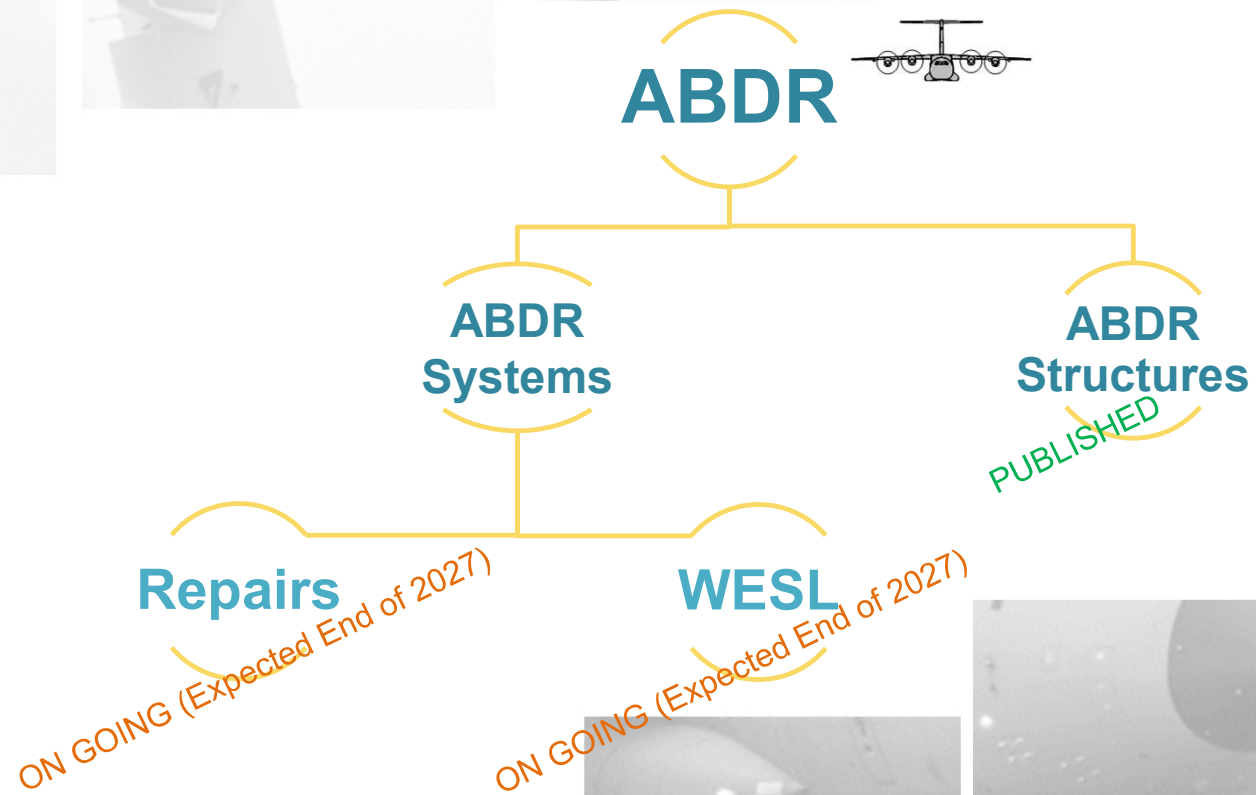


Dent without Sharp edge



Scratches

ABDR Manuals - STATUS



TID Manuals with ADL/RDL or useful information for damages

DFPRM: Duct and Fuel Pipe Repair Manual

DFPRM provides with the data necessary for the identification, inspection and repair of ducts and fuel pipes in a workshop environment. It allows the Identification of the duct, provides the limits of the allowable damage and the **instruction for the repair in order to restore them to a continuing airworthiness condition.**

ASR: Air Vehicle Structure Repair

ASR provides with the data necessary for the identification of the part, inspection and repair of the Primary and/or Secondary Structures.

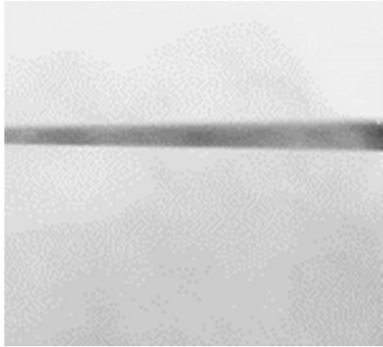
It provides the repair for two kind of damages:

- ADL: Damage with not significant effect on the strength or life of the structure where **a cosmetic repair is provided**
- RDL: Damage with a significant effect on the strength or life of the structure where an **structural repair is provided**

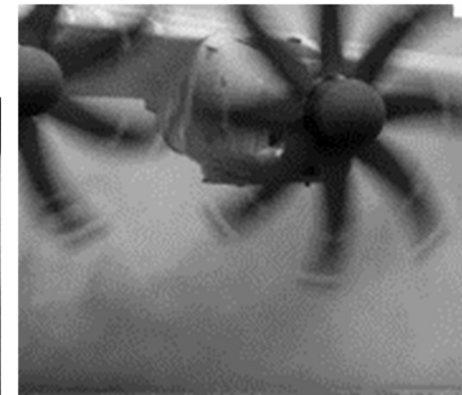
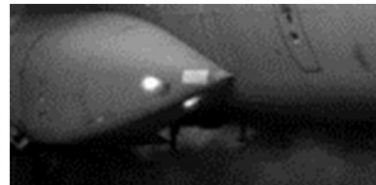
ACC: Air Vehicle Corrosion Control: ACC provides the necessary data to the maintenance personnel to **prevent and correct the structural corrosion.**

ANDT: Air Vehicle Non-Destructive Testing: ANDT instructs qualified personnel with regard to specific **non-destructive test procedures** for the A400M air vehicle.

Airbus Amber



WESL



AGENDA - WESL

- 1.- Purpose of the WESL**
- 2.- Conditions of use and Waiver of responsibilities
- 3.- WESL structure and Examples
- 4.- WESL development
- 5.- WESL use

Purpose of the WESL

- All NO DISPATCH MMEL entries are/will be analyzed in the WESL.
- WESL is designed similarly to an MMEL but with different safety classifications and under WESL conditions (see Conditions of use and Waiver of responsibilities):

ITEM under Failure – Acceptability Criteria			
MMEL		WESL	
Airworthiness/ regulatory requirement is not met → NOGO		Airworthiness/ regulatory requirement not considered → GO	
Item single Failure is MAJ or worse → NOGO		Item single Failure is MAJ at worst → GO	
Next Critical Failure – Acceptability Criteria			
MMEL		WESL	
NCF is CAT → NOGO		NCF is CAT → NOGO	
NCF is HAZ & S.O are not met → NOGO		NCF is HAZ engineering judgement → GO after	
NCF is HAZ & S.O are met → Pending Engineering Judgment/ In-service Exp.		NCF is MAJ → GO	
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SSA Review – Acceptability Criteria			
MMEL		WESL	
All HAZ & CAT FCs S.O met under dispatched item → GO		No SSA Review → GO	
All HAZ & CAT FCs S.O met Procedure (o) or (m) → GO IF		No SSA Review → GO	

Purpose of the WESL – Example of assessment (I)

System**43-81-01 Audio Management Units (AMU & EAMU)**

ECAM Warning → COM EMER AMU + AMU 1 FAULT

M MEL**Aircraft Status**EAMU and AMU 1
inoperative

→ MAJOR

**M MEL Dispatch
Condition****NO GO****WESI****Aircraft Status**EAMU and
AMU1
inoperative
→ Major**NCF**Loss AMU 2 → Total loss of
communications and
intercommunications → Major**WESL Dispatch Condition****Acceptable**

- Loss of AMU 1 & EAMU
- The NCF is the loss of AMU 2 with the total loss of communications and intercommunications

Purpose of the WESL – Example of assessment (I)

System**32 LGERS**

ECAM Warning → L/G GEAR NOT LOCKED DOWN

MMEL**Aircraft Status**

One leg not locked down

**MAJOR
(structural impact)****NCF**

Another leg of the same LG side not locked down

**CATASTROPHIC
(LG collapse during T/O run)****MMEL Dispatch Condition****NO GO****WESL****Aircraft Status**One leg not locked down
→ Major**NCF**Another leg of the same LG side not locked down
→ Catastrophic**WESL Dispatch Condition****Not recommended**

- One LG leg not locked down → possible structural damage (MAJOR).
- The NCF is having another leg of the same LG side not locked down → possible LG collapse while running on ground, for instance T/O run (CAT).

AGENDA - WESL

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Conditions of use and Waiver of responsibilities

- ❖ The analysis on which the WESL is based assesses the risk associated with an Aircraft Extraction from an unsafe wartime environment after battle damage. The specified limitation of 2 flights cycles and 6 flight hours allows a reduction of the safety margins considering the risk of the unsafe wartime environment.
- ❖ With the specified limitation of 2 flights cycles and 6 flight hours an Aircraft Extraction ferry flight can be accepted to leave the unsafe wartime environment. An Extraction ferry flight definition as per the Ferry flight definition included in A400M contract is specified as follows:
 - Extraction ferry flight limited to 2 flights cycles and 6 flight hours
 - Neither tactical missions nor military missions are considered for Extraction ferry flight.
 - Extraction ferry flight weight limitations to be included in the WESL, if any.

Under Customer Requests,
safety analysis extended to
3 FC/10 FH Ferry Flight

Conditions of use and Waiver of responsibilities

- ❖ The analysis on which the WESL is based assesses damages in one single item. No analysis is performed considering simultaneous alerts.
- ❖ WESL provides information to the Operator in order to:
 - Provide as much information as possible of Aircraft status to assess the risks with an Extraction ferry flight.
 - Provide a dispatch recommendation (Dispatch not recommended / Dispatch acceptable with or without restrictions).
- ❖ The decision to perform an Extraction Ferry Flight is always under the Operator's sole responsibility.
- ❖ WESL is not approved by CQC but its use must be endorsed by each National authorities.

AGENDA - WESL

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WESL Structure

❖ ABDR WARTIME ESSENTIAL SYSTEM LIST

- ☐ LIST OF MODIFICATIONS
- ☐ GENERAL SUMMARY OF HIGHLIGHTS
- ☐ General Information
- ☐ WESL Entries
- ☐ WESL Items
- ☐ WESL Operational Procedures
- ☐ Rationale associated with “Not Recommended” Entries

WESL Structure – WESL Entries

- This section is the recommended entry point to consult the WESL. It includes ECAM or LMWS alerts but also Crew Observations. The structure of the subsections is the same as in the MMEL:

WESL Entries

☐ Cockpit

ECAM Alert

Crew Observation

☐ Cargo Area

LMWS Alert

Crew Observation

☐ Other Areas

WESL Structure – WESL Entries

- ❖ Each WESL entry is a table composed of 2 columns:
 - Aircraft Status: this part provides an explanation of the alert/crew observation.
 - Condition of Dispatch:
 - ✓ If the dispatch is deemed acceptable, it will refer to the related WESL item
 - ✓ If the dispatch is not recommended, it will state “Not Recommended” and refer to the “Rationale associated with “Not Recommended” Entries” section.
- ❖ A WESL entry may have several “Aircraft Status” and “Condition of Dispatch” (some may be “Not Recommended”, some may refer to a WESL item)

WESL Structure – WESL Entries

COM COM CTL BACKUP NORM SW	
AIRCRAFT STATUS	CONDITION OF DISPATCH
The COM COM CTL BACKUP NORM switching is inoperative (Stuck in the NORM position).	Refer to WESL Item WE-43-51-03

<u>L/G</u> GEAR NOT LOCKED DOWN	
AIRCRAFT STATUS	CONDITION OF DISPATCH
One or more landing gear legs are not locked in the extended position.	Not Recommended Refer to Associated Rationale

WESL Structure – WESL Items

- ❖ The WESL items section is presented per ATA chapter, similarly to the MMEL
- ❖ Each WESL item has a number in 8 digits (e.g. WE-21-21-01) in order to differentiate from the MMEL (6 digits).
- ❖ Each WESL item includes:
 - Table with:
 - ✓ The Repair Interval (always set to A)
 - ✓ The Nbr Installed
 - ✓ The Nbr Required
 - Text that provides the condition of dispatch with restrictions, if any (e.g. Aircraft dispatch acceptable under WESL conditions with the following restrictions: etc.)
 - Link to the associated operational procedure, if any
 - Link to a reference of deactivation maintenance task, if any
 - Associated next critical failure(s), when relevant for the flight crew and/or for dispatch decision.

WESL Structure – WESL Items

WE-43-51-03 **COM COM CTL BACKUP NORM Switching**

- WE-43-51-03A COM CTL BACKUP NORM switch stuck in the NORM position

Repair Interval	Nbr Installed	Nbr Required
A	1	0

Dispatch acceptable under WESL conditions.

*Note: The normal communication control is still available.
If the M-MMS communication management function fails during the flight,
the control of the external audio communication will be lost and the IFF
will be kept in the last selected mode and code, or can be set to EMER
mode.*

WESL Structure – WESL Items

WE-32-33-01

Landing Gear Emergency Extension Function

WE-32-33-01A

Repair Interval	Nbr Installed	Nbr Required
A	1	0

Dispatch acceptable under WESL conditions.

***Note:** The normal extension and retraction function of the landing gear is still operative.
If the normal extension function of the landing gear fails during the flight, the aircraft will land with the NLG not extended, or with the MLG extended on one side only, or with the MLG not extended.*

WESL Structure – WESL Operational Procedures

- ❖ The WESL Operational Procedures section will have the same structure and the same display as the MMEL Operational Procedures.

WESL Structure - Rationale associated with “Not Recommended” Entries

- ❖ This section provides the rationale(s) linked to each alert/crew observation that is “Not Recommended” in the WESL Entries Section.

LANDING GEAR LEGS NOT LOCKED IN EXTENDED POSITION

Depending on the failure case:

AT LEAST ONE LEG ON THE REAR MLG IS AFFECTED

The dispatch of the aircraft is not recommended because the landing gear will not be able to support the loads during takeoff and will collapse.

NONE OF THE LEG ON THE REAR MLG IS AFFECTED

The dispatch of the aircraft is not recommended because if another MLG leg fails during takeoff run, the remaining landing gear legs will collapse.

AGENDA - WESL

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WESL Development

- ❖ WESL is currently under development (≈ 124 alerts available)
 - ❖ Following ATA chapters Dossiers presented to OCCAR/ Nations in two workshops:
 - ATA31 FWS, ATA34 ISIS, ATA32-31 (L/G), ATA35, ATA36, ATA43, ATA56
 - ATA 21, ATA 27-50 (HLS), ATA 30, ATA 42, ATA 46
 - ❖ ATA 33, ATA 49, ATA 29, ATA 26, ATA 34 RA Dossiers available to be presented to the OCCAR/Nations
- ❖ Remaining ATA chapters: (≈ 297 alerts)
 - ATA 32 (braking, kneeling, steering), ATA 34 (GADIRS), ATA 60-80, ATA 24, ATA 28, ATA 22, ATA 27 (flight controls), ATA 25, ATA 31-CDS, ATA 52.

AGENDA - WESL

- 1.- Purpose of the WESL
- 2.- Conditions of use and Waiver of responsibilities
- 3.- WESL structure and Examples
- 4.- WESL development
- 5.- WESL use**

WESL Use

- ❖ Access to WESL available information provided to OCCAR/Nations at the beginning of Ukraine Crisis (letter to OCCAR March 2022)

- ❖ Orionis Exercise by FAF on March 23th/24th 2023

Theoretical Scenario: Runway excursion after landing in unprepared runway in hostile country.

- 2 customer requests inside this scenario
 - No spares, to provide way forward to allow Ferry Flight to MOB
 - to provide way forward to continue operation for 50 FH
- Temporary repairs expected. Use of ABDR and use of WESL

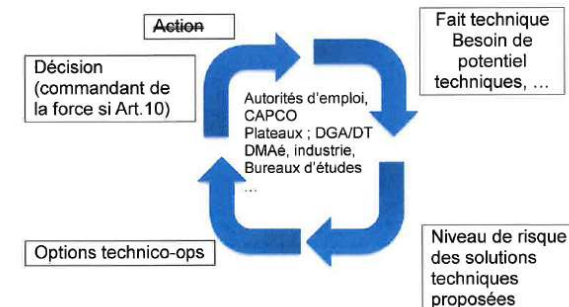
- Ecam status:

- Engine #1 FADEC SYST FAULT with ACOC actuator locked in open position
- Brakes Norm BRK fault + Brakes EMER BRK fault + Brakes ALTN BRK fault
- L/G control 1+2 fault

For information, recovery operation has been done. MSN 110 is stand up only by 2 L/G on the left side. 5&6 wheels have been changed.
 the recovery operation done, with maximum safety conditions as possible by using the WESL.



Boucle OODA technico-ops
finalité opérationnelle

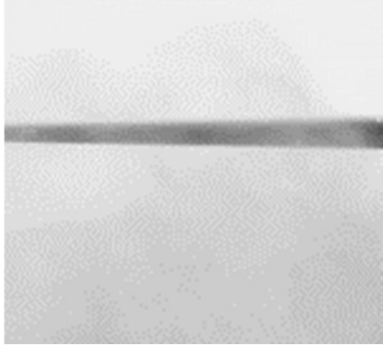


ABDR and WESL: manuals for wartime

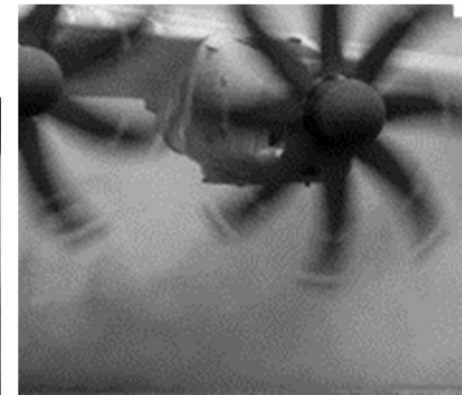
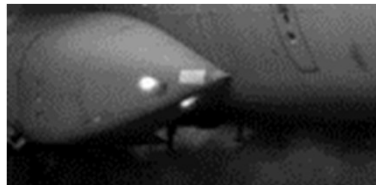
Amaia Castelló, Sergio Morales Roderó, and Amélie Ruau
Airbus Defence and Space

DEFENCE AND SPACE

AIRBUS



ABDR



AGENDA - ABDR

1.- Purpose of the ABDR

2.- ABDR Structures

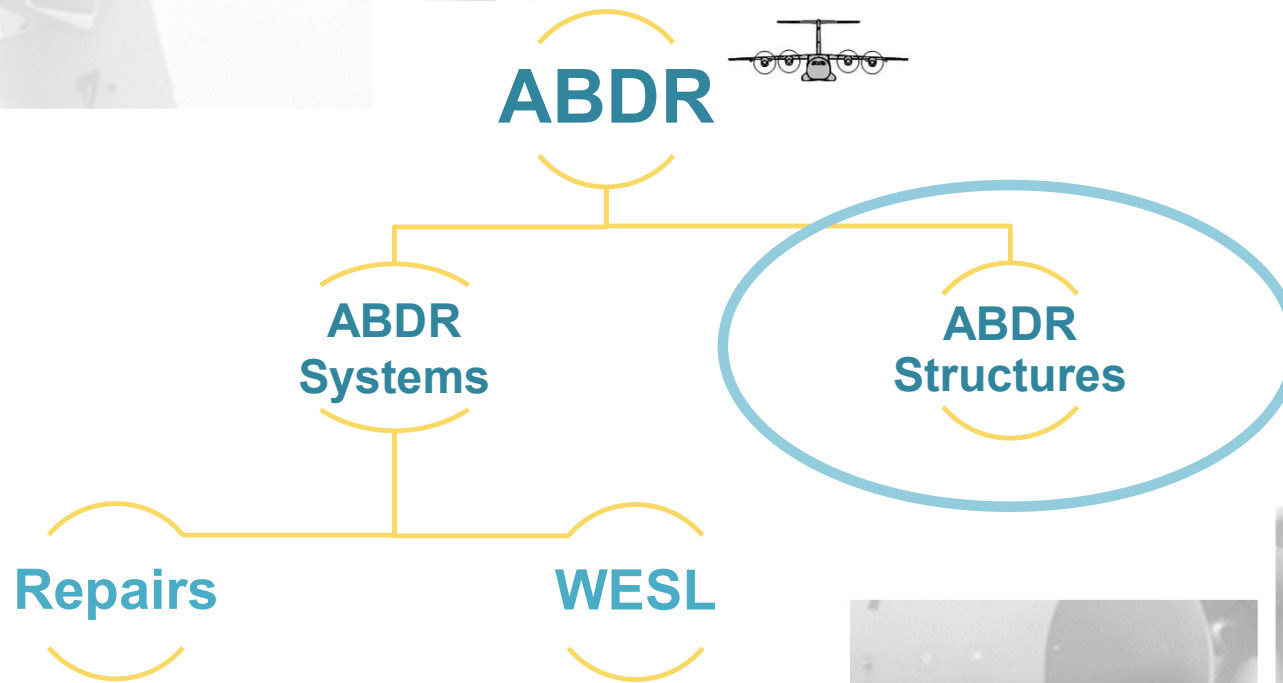
3.- ABDR Structures Examples

4.- ABDR Systems

5.- TID Manuals with ADL/RDL or useful information for damages Systems

6 .- ABDR status

ABDR Manuals - General Presentation



Purpose of the ABDR

ABDR stands for **Aircraft Battle Damage Repair Manual**.

The ABDR manual provides guidance for **simplifying maintenance and repairs** in a wartime condition, reducing the time needed for enabling the A/C dispatch following a battle damage.

The dispatch to be performed is an Extraction (Ferry) Flight (2FC/6FH) or Short mission deployment (28FC/100FH) with possible limitations in speed and ceiling.

The main goal is to operate the A/C with a minimum of acceptable level of safety; to save the crew and to transfer the A/C to a secure base.

ABDR is not subject to Airworthiness Approval.

The liability of the dispatch belongs to the Commander and/or the relevant national operational authority.

ABDR Structures

The ABDR Structures allows aircraft flight with a **certain level of unrepaired damage** or **performing quick and simplified repairs**.

The manual contains technical data that is helpful to resume operation after suffering battle damage, thus **increasing its operability** by reducing the standard safety margins established in the certification basis.

Type of Damages to be addressed by ABDR Structures are in line with the type of damages addressed by ASR:

- Skin cracks.
- Piercing bullet damage.
- Damage other than a single circular hole (dents, scratches, delaminations, multiple perforations, etc): In general the stress justification for the piercing bullet damage shall target when possible to cover any damage which is included in a circle with a diameter of 125 mm.

ABDR Structures

Structure classification:

Category A: Structures identified as Principal Structural Elements (PSE). These are elements that contribute significantly to carry flight, ground or pressurization loads and whose failure can result in **catastrophic failure** of the aircraft.

Category B: Structures whose failure or detachment can indirectly compromise continued safe flight or landing by and adverse effect on Category A structure.

- Structures whose failure can significantly change the static or dynamic loading on a Category A structure.
- Structures which if released from the aircraft can cause a potential catastrophic impact with a Category A structure.

Category C: This includes structures whose failure or detachment **will not compromise continued safe flight** or landing but where the potentially large size of released elements need to be considered.

Category D: These are structures whose failure or detachment has no airworthiness but only an **economic impact**.

Type of damages:

ALLOWABLE DAMAGE (AD). Damages within a limit that does not impose operational restrictions on the aircraft if structural repair is not done.

ALLOWABLE DAMAGE WITH OPERATIONAL RESTRICTIONS (RD). Damages that produce the appliance of limitations if they are not repaired. The purpose of this damage type is to make possible ferry flight missions when time to repair is an operationally critical factor.

NOT ALLOWABLE DAMAGE (NR). Damages outside limits. They need to be repaired and no partial limitations are allowed.

ABDR EXAMPLES

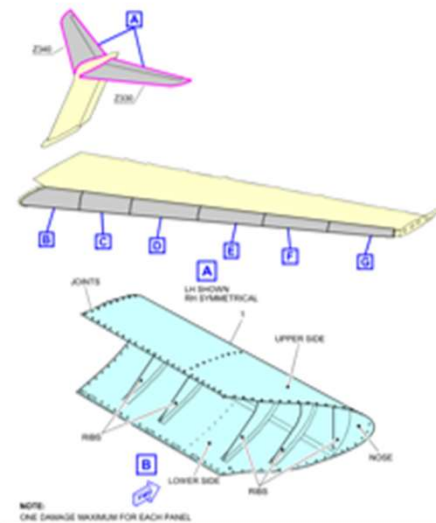
• Air Intake Cowls – Category C

NOTE: A maximum of one damage for each panel is permitted.

ITEM	NOMENCLATURE	MATERIAL	CAT.	DAMAGE LIMITATIONS AND RESTRICTIONS	ACTION OR REPAIR
Fig. 1 Item 1	UPPER INTAKE COWL	Composite	C	[AD] FF and RTM: - Area < 43239 mm ² (67.02 in ²) - L < 213 mm (8.39 in). Damage can be found in the core zone.	If open holes have a diameter less than or equal to 50 mm (1.97 in), use high speed tape (Material 08-052) to restore the aerodynamic profile. If open holes have a diameter of more than 50 mm (1.97 in), use an aerodynamic patch.
Fig. 1 Item 2	REAR INTAKE COWL	Composite	C	[AD] FF and RTM: No damage is permitted.	No further action.
Fig. 1 Item 3	LOWER INTAKE COWL	Composite	C	[AD] FF and RTM: - Area < 36300 mm ² (56.26 in ²) - L < 220 mm (8.66 in). Damage can be found in the core zone.	If open holes have a diameter less than or equal to 50 mm (1.97 in), use high speed tape (Material 08-052) to restore the aerodynamic profile. If open holes have a diameter of more than 50 mm (1.97 in), use an aerodynamic patch.
Fig. 1 Item 4	PGB ACCESS PANELS 413AL 423AL 433AL 443AL	Composite	C	[AD] FF and RTM: - Area < 55647 mm ² (86.25 in ²) - L < 243 mm (9.57 in). Damage can be found in the core zone.	If open holes have a diameter less than or equal to 50 mm (1.97 in), use high speed tape (Material 08-052) to restore the aerodynamic profile. If open holes have a diameter of more than 50 mm (1.97 in), use an aerodynamic patch.

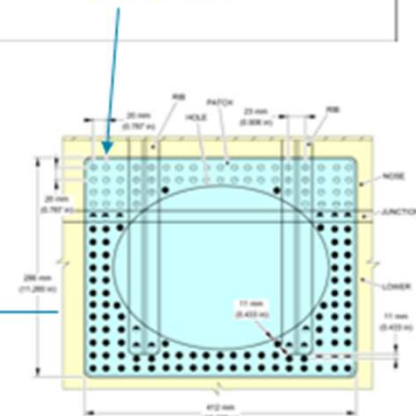
ABDR STRUCTURES EXAMPLES

• HTP LE Panels – Category C



NOTE: A maximum of one damage for each panel is permitted.

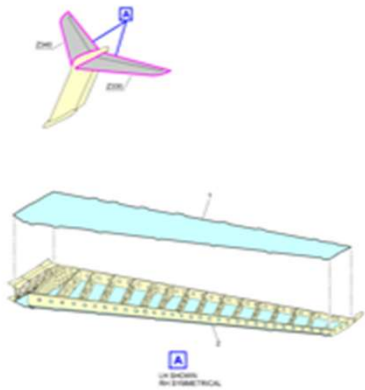
ITEM	NOMENCLATURE	MATERIAL	CAT.	DAMAGE LIMITATIONS AND RESTRICTIONS	ACTION OR REPAIR
				[AD] FF: - $L \leq 325$ mm (12.80 in) - $r/a \leq 0.3$ - $a/H \leq 0.4$ The maximum dimension of the open hole is 200x325 mm (7.87x12.80 in). The maximum dimension of the open hole in the chord direction is 200 mm (7.87 in). RTM: - $L \leq 150$ mm (5.91 in) - $r/a \leq 0.3$ - $a/H \leq 0.4$ The maximum dimension of the open hole is 150x70 mm (5.91x2.76 in).	If the hole is less than or equal to 50 mm (1.97 in), use high speed tape (Material 05-005) to restore the aerodynamic profile. If the hole is more than 50 mm (1.97 in), use an aerodynamic patch.
				[RD] RTM: - $L \leq 325$ mm (12.80 in). The maximum dimension of the open hole is 200x325 mm (7.87x12.80 in). The maximum dimension of the open hole in the chord direction is 200 mm (7.87 in).	Do the Trimmable Horizontal Stabilizer (THS) leading edge repair procedure (Ref. AJA-00-90-55-22727-6857 A).



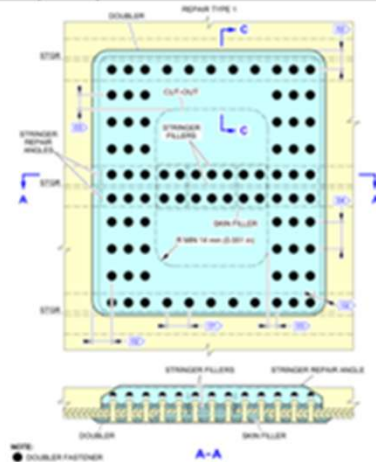
ASR

ABDR EXAMPLES

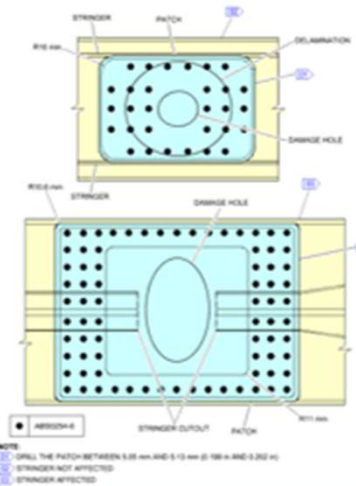
• HTP Spar Box – Skin Panels – Category A



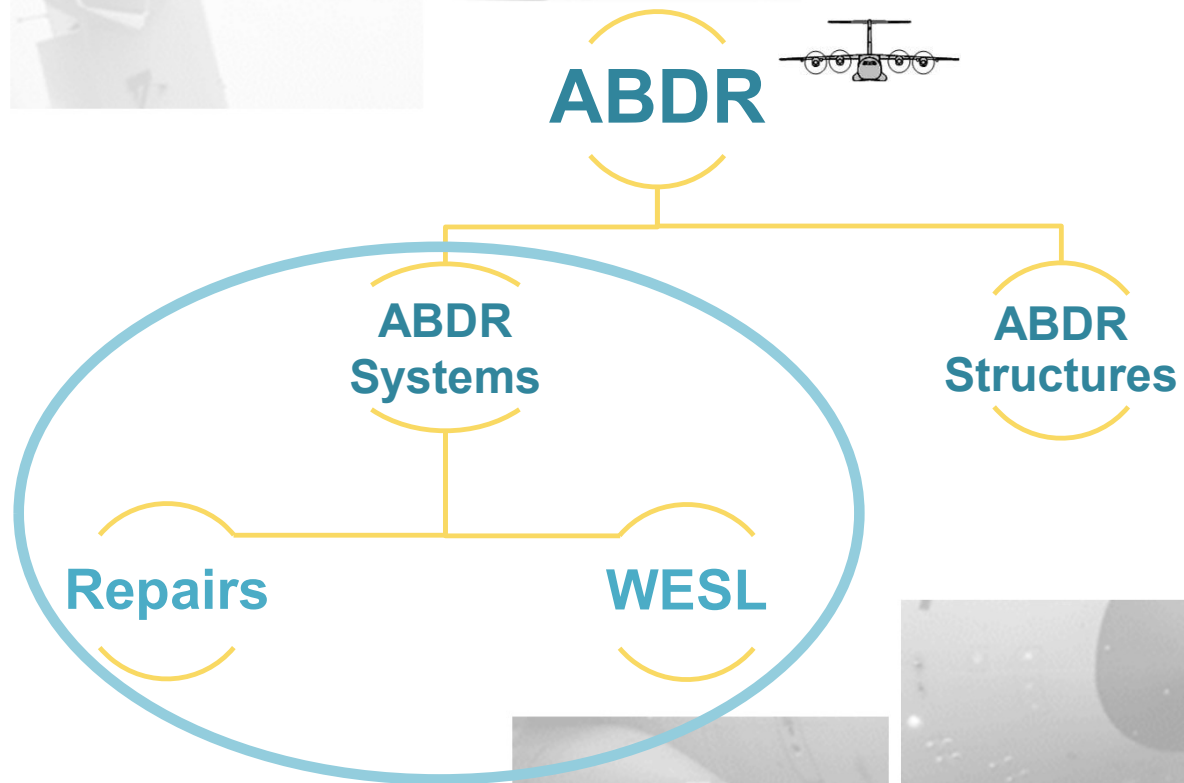
ITEM	NOMENCLATURE	MATERIAL	CAT.	DAMAGE LIMITATIONS AND RESTRICTIONS	ACTION OR REPAIR
Fig. 1 Tab. 1	HORIZONTAL TAIL PLANE (HTP) UPPER SKIN	Composite	A	[AD] FP: - L < 400 mm (15.75 in) and a maximum of one stringer is damaged. The maximum dimension of the hole must be 200x250 mm (7.87x9.84 in). See remarks: - <1> - <2> - <3> - <4> RTM: - L < 250 mm (9.84 in) and no stringer is damaged. See remarks: - <1> - <2> - <3> - <4>	If the hole is less than or equal to 50 mm (1.97 in), use high speed tape (Material 05.000) to restore the aerodynamic profile. If the hole is more than 50 mm (1.97 in), use an aerodynamic patch.
				[RD] RTM: - L < 400 mm (15.75 in) and a maximum of one stringer is damaged. The maximum dimension of the hole must be 200x250 mm (7.87x9.84 in). See remarks: - <1> - <2> - <3> - <4>	Do the THS leading-edge repair procedure (Ref. A/A.00.00.05.21ZZ.6052.A)



ASR



ABDR Manuals - General Presentation



ABDR Systems

ABDR Systems repairs will be **standard repairs**, based on existing documentation (e.g. DFPRM).

While the permanent repairs are developed for the DFPRM, it is proposed to generate corresponding temporary repairs that will be used exclusively in ABDR. The content of these temporary repairs must be validated by DO in ABDR specific context considerations.

Type of Damages to be addressed by ABDR System will be the same as DFPRM:

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Cracked fuel pipe

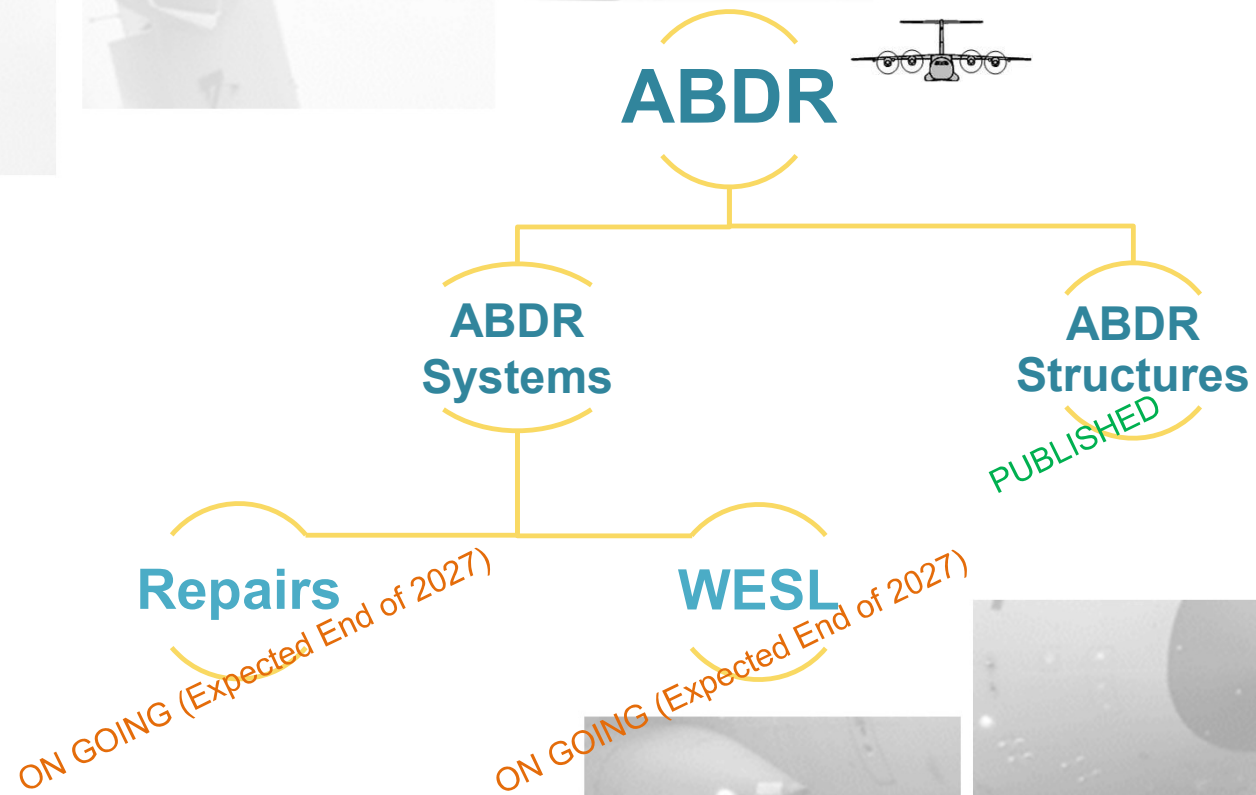


Dent without Sharp edge



Scratches

ABDR Manuals - STATUS



TID Manuals with ADL/RDL or useful information for damages

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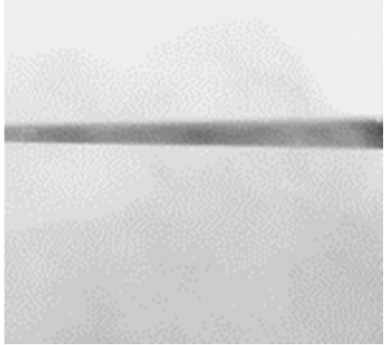
It provides the repair for two kind of damages:

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- RDL: Damage with a significant effect on the strength or life of the structure where an **structural repair is provided**

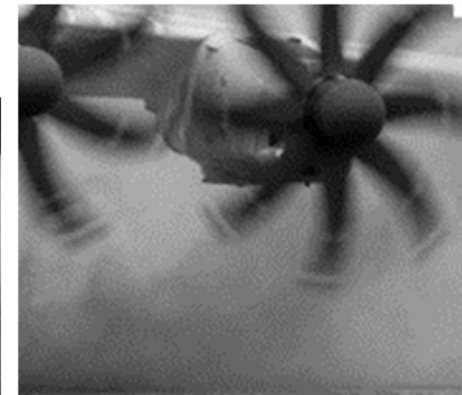
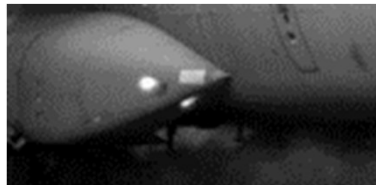
ACC: Air Vehicle Corrosion Control: ACC provides the necessary data to the maintenance personnel to **prevent and correct the structural corrosion.**

ANDT: Air Vehicle Non-Destructive Testing: ANDT instructs qualified personnel with regard to specific **non-destructive test procedures** for the A400M air vehicle.

Airbus Amber



WESL



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MMEL		WESL	
Airworthiness/ regulatory requirement is not met → NOGO		Airworthiness/ regulatory requirement not considered → GO	
Item single Failure is MAJ or worse → NOGO		Item single Failure is MAJ at worst → GO	
Next Critical Failure – Acceptability Criteria			
MMEL		WESL	
NCF is CAT → NOGO		NCF is CAT → NOGO	
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NCF is HAZ & S.O are met → Pending Engineering Judgment/ In-service Exp.		NCF is MAJ → GO	
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MMEL		WESL	
All HAZ & CAT FCs S.O met under dispatched item → GO		No SSA Review → GO	
All HAZ & CAT FCs S.O met Procedure (o) or (m) → GO IF		No SSA Review → GO	

Purpose of the WESL – Example of assessment (I)

System**43-81-01 Audio Management Units (AMU & EAMU)**

ECAM Warning → COM EMER AMU + AMU 1 FAULT

M MEL**Aircraft Status**EAMU and AMU 1
inoperative

→ MAJOR

**M MEL Dispatch
Condition****NO GO****WESI****Aircraft Status**EAMU and
AMU1
inoperative
→ Major**NCF**Loss AMU 2 → Total loss of
communications and
intercommunications → Major**WESL Dispatch Condition****Acceptable**

- Loss of AMU 1 & EAMU
- The NCF is the loss of AMU 2 with the total loss of communications and intercommunications

Purpose of the WESL – Example of assessment (I)

System**32 LGERS**

ECAM Warning → L/G GEAR NOT LOCKED DOWN

MMEL**Aircraft Status**

One leg not locked down

**MAJOR
(structural impact)****NCF**

Another leg of the same LG side not locked down

**CATASTROPHIC
(LG collapse during T/O run)****MMEL Dispatch Condition****NO GO****WESL****Aircraft Status**One leg not locked down
→ Major**NCF**Another leg of the same LG side not locked down
→ Catastrophic**WESL Dispatch Condition****Not recommended**

- One LG leg not locked down → possible structural damage (MAJOR).
- The NCF is having another leg of the same LG side not locked down → possible LG collapse while running on ground, for instance T/O run (CAT).

AGENDA - WESL

- 1.- Purpose of the WESL
- 2.- Conditions of use and Waiver of responsibilities**
- 3.- WESL structure and Examples
- 4.- WESL development
- 5.- WESL use

Conditions of use and Waiver of responsibilities

- ❖ The analysis on which the WESL is based assesses the risk associated with an Aircraft Extraction from an unsafe wartime environment after battle damage. The specified limitation of 2 flights cycles and 6 flight hours allows a reduction of the safety margins considering the risk of the unsafe wartime environment.
- ❖ With the specified limitation of 2 flights cycles and 6 flight hours an Aircraft Extraction ferry flight can be accepted to leave the unsafe wartime environment. An Extraction ferry flight definition as per the Ferry flight definition included in A400M contract is specified as follows:
 - Extraction ferry flight limited to 2 flights cycles and 6 flight hours
 - Neither tactical missions nor military missions are considered for Extraction ferry flight.
 - Extraction ferry flight weight limitations to be included in the WESL, if any.

Under Customer Requests,
safety analysis extended to
3 FC/10 FH Ferry Flight

Conditions of use and Waiver of responsibilities

- ❖ The analysis on which the WESL is based assesses damages in one single item. No analysis is performed considering simultaneous alerts.
- ❖ WESL provides information to the Operator in order to:
 - Provide as much information as possible of Aircraft status to assess the risks with an Extraction ferry flight.
 - Provide a dispatch recommendation (Dispatch not recommended / Dispatch acceptable with or without restrictions).
- ❖ The decision to perform an Extraction Ferry Flight is always under the Operator's sole responsibility.
- ❖ WESL is not approved by CQC but its use must be endorsed by each National authorities.

AGENDA - WESL

- 1.- Purpose of the WESL
- 2.- Conditions of use and Waiver of responsibilities
- 3.- WESL structure and Examples**
- 4.- WESL development
- 5.- WESL use

WESL Structure

❖ ABDR WARTIME ESSENTIAL SYSTEM LIST

- ☐ LIST OF MODIFICATIONS
- ☐ GENERAL SUMMARY OF HIGHLIGHTS
- ☐ General Information
- ☐ WESL Entries
- ☐ WESL Items
- ☐ WESL Operational Procedures
- ☐ Rationale associated with “Not Recommended” Entries

WESL Structure – WESL Entries

- This section is the recommended entry point to consult the WESL. It includes ECAM or LMWS alerts but also Crew Observations. The structure of the subsections is the same as in the MMEL:

WESL Entries

☐ Cockpit

ECAM Alert

Crew Observation

☐ Cargo Area

LMWS Alert

Crew Observation

☐ Other Areas

WESL Structure – WESL Entries

- ❖ Each WESL entry is a table composed of 2 columns:
 - Aircraft Status: this part provides an explanation of the alert/crew observation.
 - Condition of Dispatch:
 - ✓ If the dispatch is deemed acceptable, it will refer to the related WESL item
 - ✓ If the dispatch is not recommended, it will state “Not Recommended” and refer to the “Rationale associated with “Not Recommended” Entries” section.
- ❖ A WESL entry may have several “Aircraft Status” and “Condition of Dispatch” (some may be “Not Recommended”, some may refer to a WESL item)

WESL Structure – WESL Entries

COM COM CTL BACKUP NORM SW	
AIRCRAFT STATUS	CONDITION OF DISPATCH
The COM COM CTL BACKUP NORM switching is inoperative (Stuck in the NORM position).	Refer to WESL Item WE-43-51-03

<u>L/G</u> GEAR NOT LOCKED DOWN	
AIRCRAFT STATUS	CONDITION OF DISPATCH
One or more landing gear legs are not locked in the extended position.	Not Recommended Refer to Associated Rationale

WESL Structure – WESL Items

- ❖ The WESL items section is presented per ATA chapter, similarly to the MMEL
- ❖ Each WESL item has a number in 8 digits (e.g. WE-21-21-01) in order to differentiate from the MMEL (6 digits).
- ❖ Each WESL item includes:
 - Table with:
 - ✓ The Repair Interval (always set to A)
 - ✓ The Nbr Installed
 - ✓ The Nbr Required
 - Text that provides the condition of dispatch with restrictions, if any (e.g. Aircraft dispatch acceptable under WESL conditions with the following restrictions: etc.)
 - Link to the associated operational procedure, if any
 - Link to a reference of deactivation maintenance task, if any
 - Associated next critical failure(s), when relevant for the flight crew and/or for dispatch decision.

WESL Structure – WESL Items

WE-43-51-03 **COM COM CTL BACKUP NORM Switching**

- WE-43-51-03A COM CTL BACKUP NORM switch stuck in the NORM position

Repair Interval	Nbr Installed	Nbr Required
A	1	0

Dispatch acceptable under WESL conditions.

*Note: The normal communication control is still available.
If the M-MMS communication management function fails during the flight, the control of the external audio communication will be lost and the IFF will be kept in the last selected mode and code, or can be set to EMER mode.*

WESL Structure – WESL Items

WE-32-33-01

Landing Gear Emergency Extension Function

WE-32-33-01A

Repair Interval	Nbr Installed	Nbr Required
A	1	0

Dispatch acceptable under WESL conditions.

*Note: The normal extension and retraction function of the landing gear is still operative.
If the normal extension function of the landing gear fails during the flight, the aircraft will land with the NLG not extended, or with the MLG extended on one side only, or with the MLG not extended.*

WESL Structure – WESL Operational Procedures

- ❖ The WESL Operational Procedures section will have the same structure and the same display as the MMEL Operational Procedures.

WESL Structure - Rationale associated with “Not Recommended” Entries

- ❖ This section provides the rationale(s) linked to each alert/crew observation that is “Not Recommended” in the WESL Entries Section.

LANDING GEAR LEGS NOT LOCKED IN EXTENDED POSITION

Depending on the failure case:

AT LEAST ONE LEG ON THE REAR MLG IS AFFECTED

The dispatch of the aircraft is not recommended because the landing gear will not be able to support the loads during takeoff and will collapse.

NONE OF THE LEG ON THE REAR MLG IS AFFECTED

The dispatch of the aircraft is not recommended because if another MLG leg fails during takeoff run, the remaining landing gear legs will collapse.

AGENDA - WESL

- 1.- Purpose of the WESL
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WESL Development

- ❖ WESL is currently under development (≈ 124 alerts available)
 - ❖ Following ATA chapters Dossiers presented to OCCAR/ Nations in two workshops:
 - ATA31 FWS, ATA34 ISIS, ATA32-31 (L/G), ATA35, ATA36, ATA43, ATA56
 - ATA 21, ATA 27-50 (HLS), ATA 30, ATA 42, ATA 46
 - ❖ ATA 33, ATA 49, ATA 29, ATA 26, ATA 34 RA Dossiers available to be presented to the OCCAR/Nations
- ❖ Remaining ATA chapters: (≈ 297 alerts)
 - ATA 32 (braking, kneeling, steering), ATA 34 (GADIRS), ATA 60-80, ATA 24, ATA 28, ATA 22, ATA 27 (flight controls), ATA 25, ATA 31-CDS, ATA 52.

AGENDA - WESL

- 1.- Purpose of the WESL
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- 5.- WESL use**

WESL Use

- ❖ Access to WESL available information provided to OCCAR/Nations at the beginning of Ukraine Crisis (letter to OCCAR March 2022)

- ❖ Orionis Exercise by FAF on March 23th/24th 2023

Theoretical Scenario: Runway excursion after landing in unprepared runway in hostile country.

- 2 customer requests inside this scenario
 - No spares, to provide way forward to allow Ferry Flight to MOB
 - to provide way forward to continue operation for 50 FH
- Temporary repairs expected. Use of ABDR and use of WESL

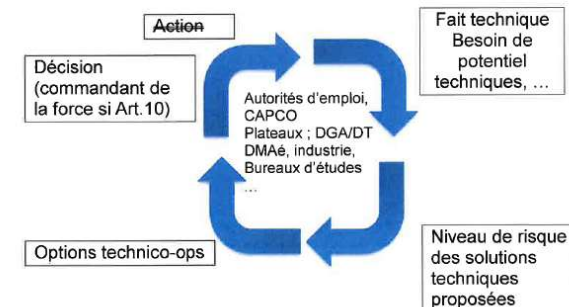
- Ecam status:

- Engine #1 FADEC SYST FAULT with ACOC actuator locked in open position
- Brakes Norm BRK fault + Brakes EMER BRK fault + Brakes ALTN BRK fault
- L/G control 1+2 fault

For information, recovery operation has been done. MSN 110 is stand up only by 2 L/G on the left side. 5&6 wheels have been changed.
 the recovery operation done, with maximum safety conditions as possible by using the WESL.



Boucle OODA technico-ops
finalité opérationnelle





MILITARY AIRWORTHINESS CONFERENCE



8 & 9 October
The Hague, The Netherlands

Hosted by



#MAC25



Indian Military Airworthiness Framework & Mutual Cooperation

Chief Executive(Airworthiness)
CEMILAC, DRDO, MoD, India



@ EDA Conference, Hague
08-09 Oct 2025

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Agenda

Part – A : Indian Military Aviation : Overview

- History of Indian Military Aviation

Part – B : Indian Military Airworthiness Framework

- Indian Military Airworthiness : Evolution
- New Framework : IMAP & IMTAR -21
- Stakeholders in Indian Military Airworthiness

Part – C : Centre for Military Airworthiness & Certification

- CEMILAC : Charter of Responsibilities
- Certification Modernization & Reforms

Part – D: Mutual Cooperation

- Need for Mutual Cooperation
- CEMILAC's Initiatives



PART – A

Overview of Indian Military Aviation



Indian Military Aviation

Strong Military Aviation : Beginning from World War – II

State Aircraft operated by : Three Armed Forces (Airforce, Navy & Army), Coast Guard & many Paramilitary Forces

Strong Aviation Fleet

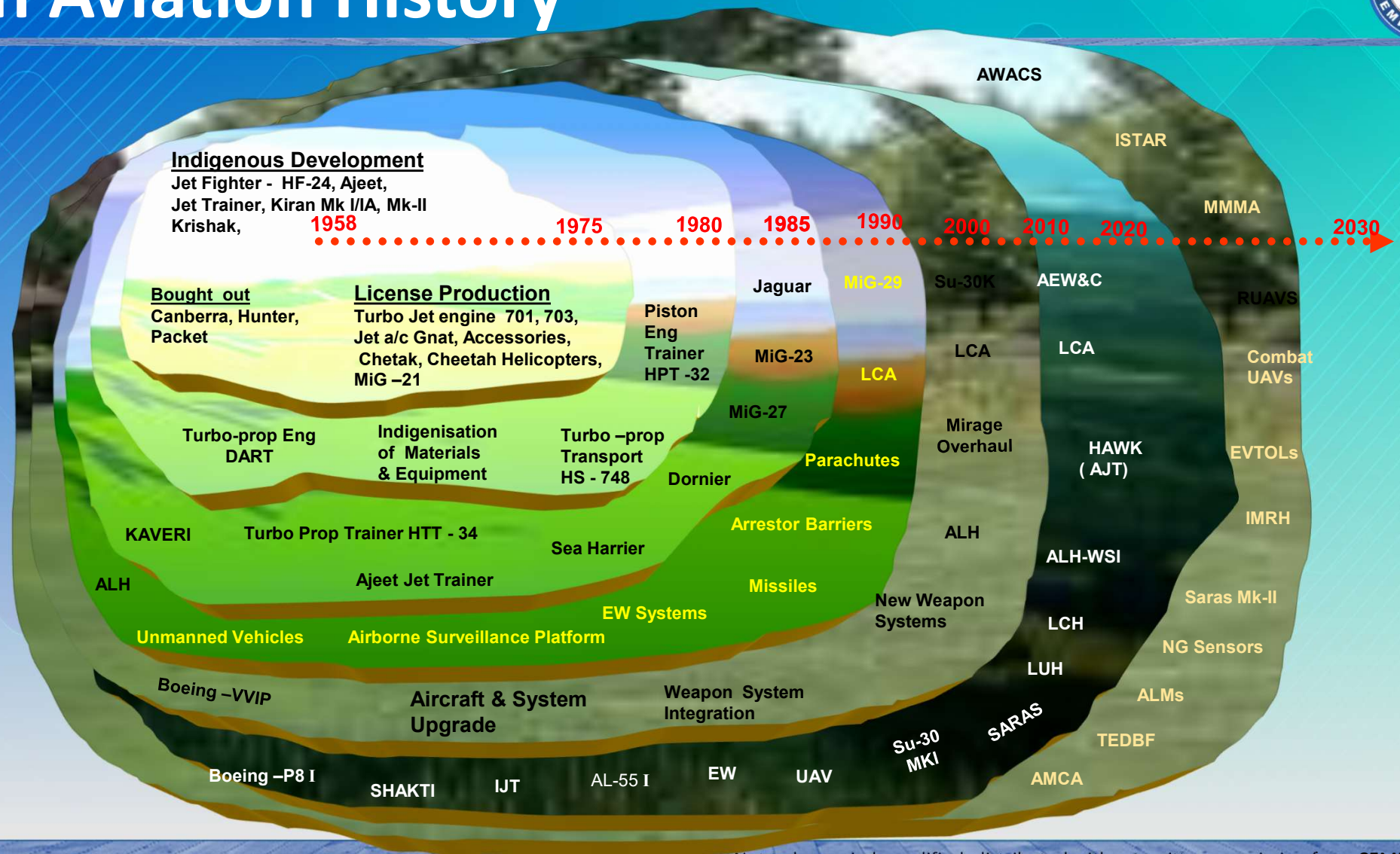
In possession of thousands of fighters, helicopters, transport, trainers and UAVs

Aircraft of varied Origin : Western, Russian and Indigenous

Demonstrated capability for Design & Develop, Produce and Sustain

Strong Manufacturing base for Aviation products

Indian Aviation History



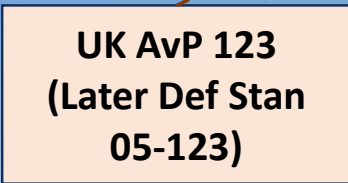
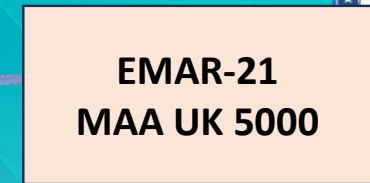
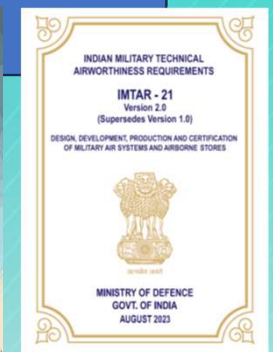
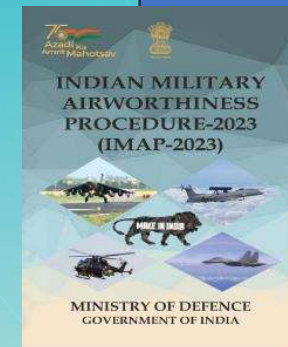
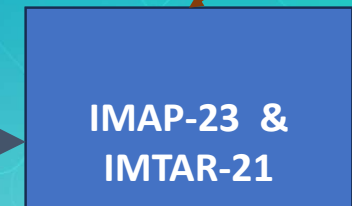
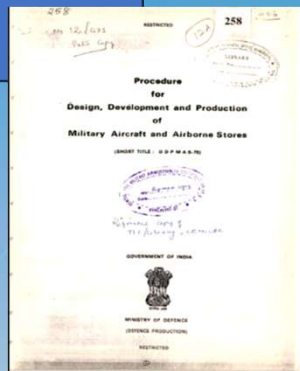
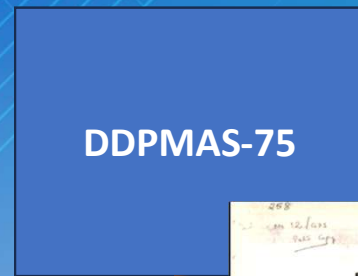


PART – B

Indian Military Airworthiness Framework



Evolution of Military Airworthiness



Emphasis on Licensed
Manufacturing



Focused on Indigenous
Aircraft Development

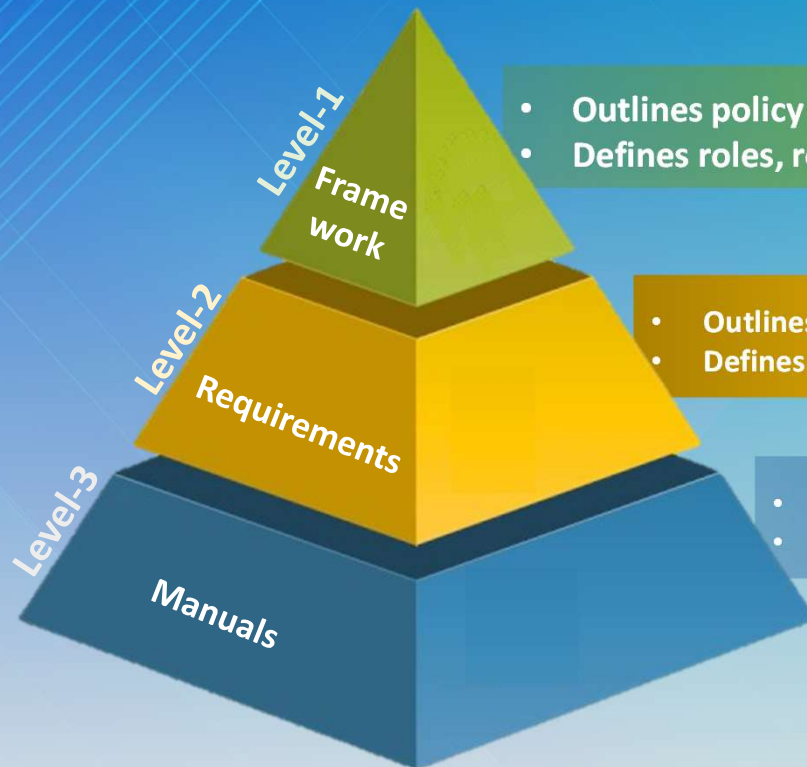


Harmonized with International
Practices

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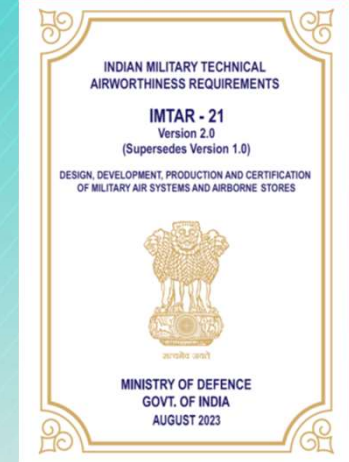
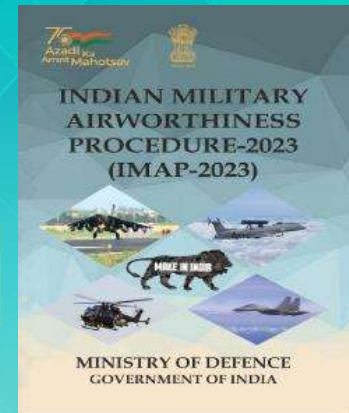
Latest Airworthiness Framework



- Outlines policy level aspects of Airworthiness
- Defines roles, responsibilities and empowerment of all the stakeholders

- Outlines procedural aspects towards Airworthiness
- Defines Technical Airworthiness Requirements for Airworthiness

- Airworthiness Certification Criteria
- Circulars, Directives, Forms, Templates





Military Airworthiness : Definitions

Military Airworthiness :

"Is the continued capability of the military Air Systems and Airborne Stores to perform satisfactorily and fulfill mission requirements, throughout the specified life in the specified environments with acceptable levels of safety and reliability"

Safety

Survivability

Mission Success

Technical Airworthiness

Is concerned with ensuring aircraft

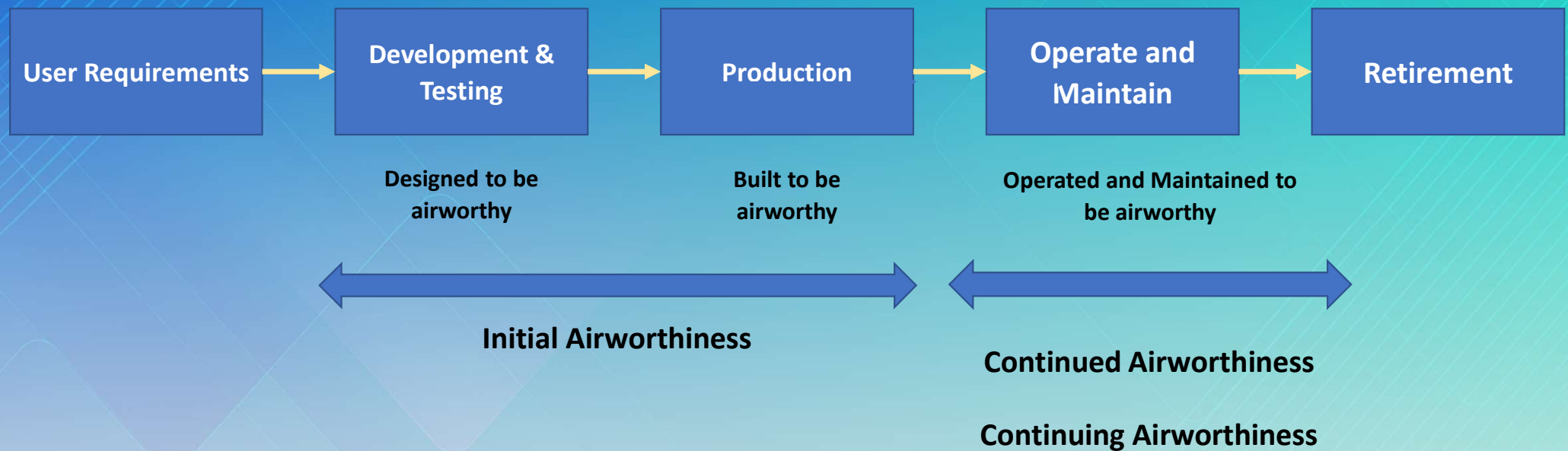
- are designed, constructed and maintained
- to approved standards and data
- by competent and authorized individuals, working within approved organizations
- under a system of certification & acceptance.

Operational Airworthiness

Is concerned with ensuring aircraft

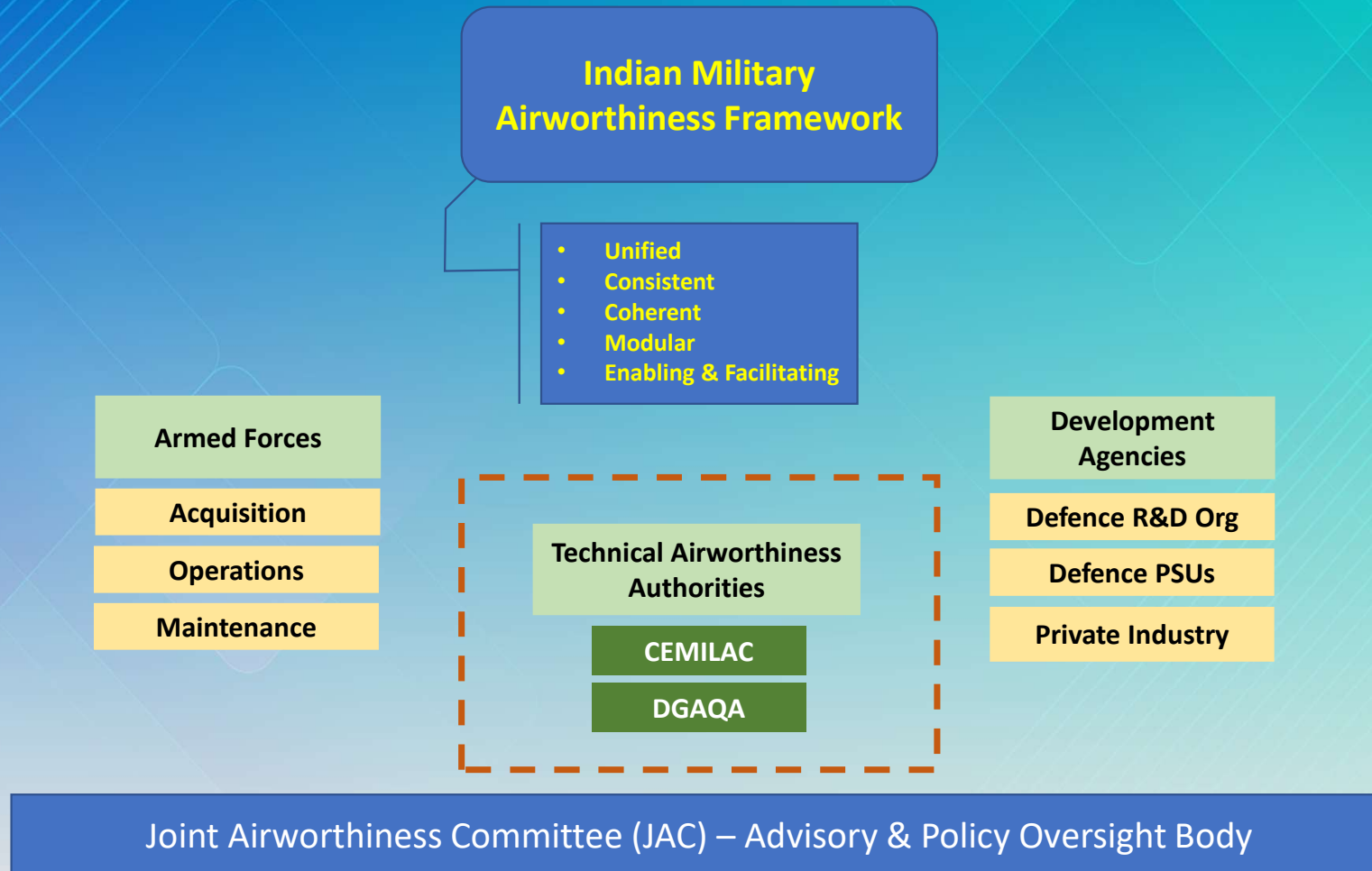
- are operated in approved roles,
- with correct mission equipment,
- by competent and authorized individuals, iaw approved procedures & instructions
- under a system of supervision & monitoring

Military Airworthiness : Phases





Airworthiness : Stakeholders





Indian TAA : CEMILAC & DGAQA

CEMILAC
Centre for Military
Airworthiness &
Certification

**Technical
Airworthiness**

DGAQA
Director General of
Aeronautical Quality
Assurance

Compliance

**Ensuring Design
and Test
Adequacy
through reviews
analysis &
testing**

**Complementary roles to
ensure Airworthiness**

**Technical & Administrative
Independence**

**Ensures Checks & Balances in
safety critical domains**

Conformity

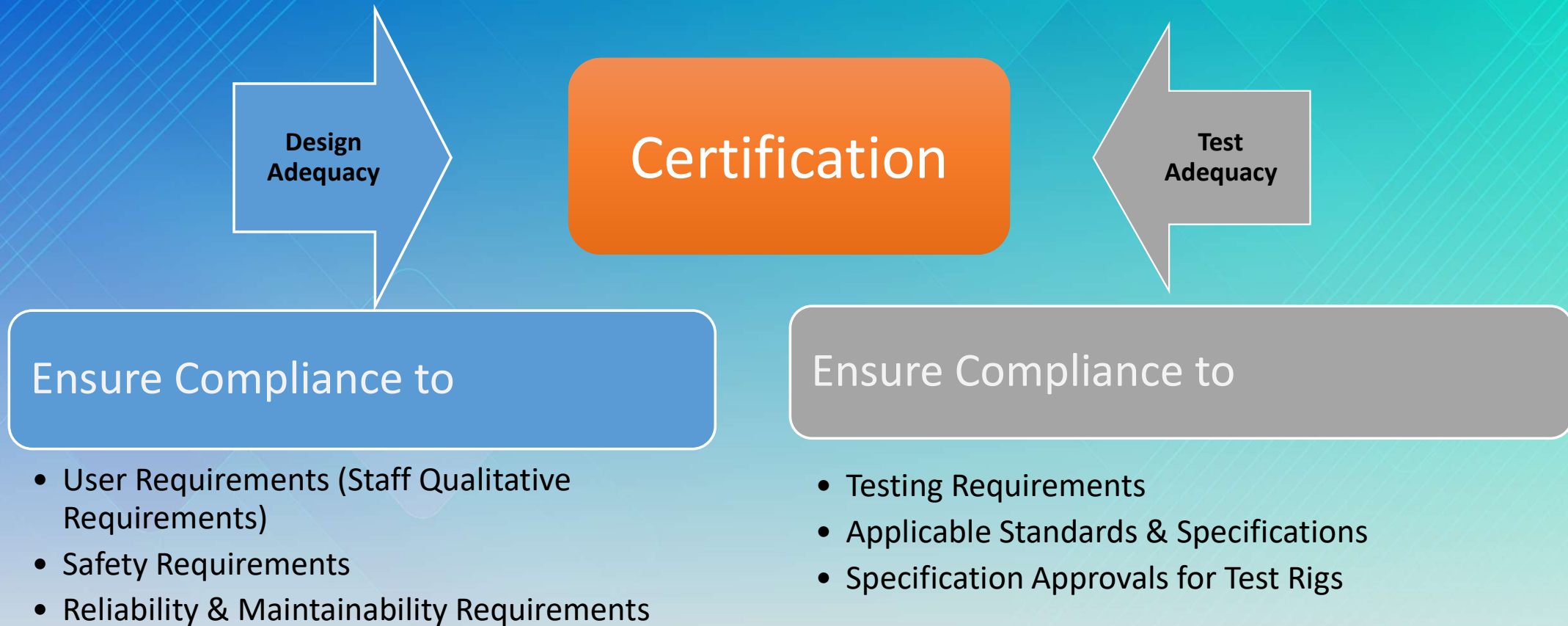
**Ensuring quality
assurance
through
inspections,
process audits**



PART – C

Centre for Military Airworthiness & Certification (CEMILAC)

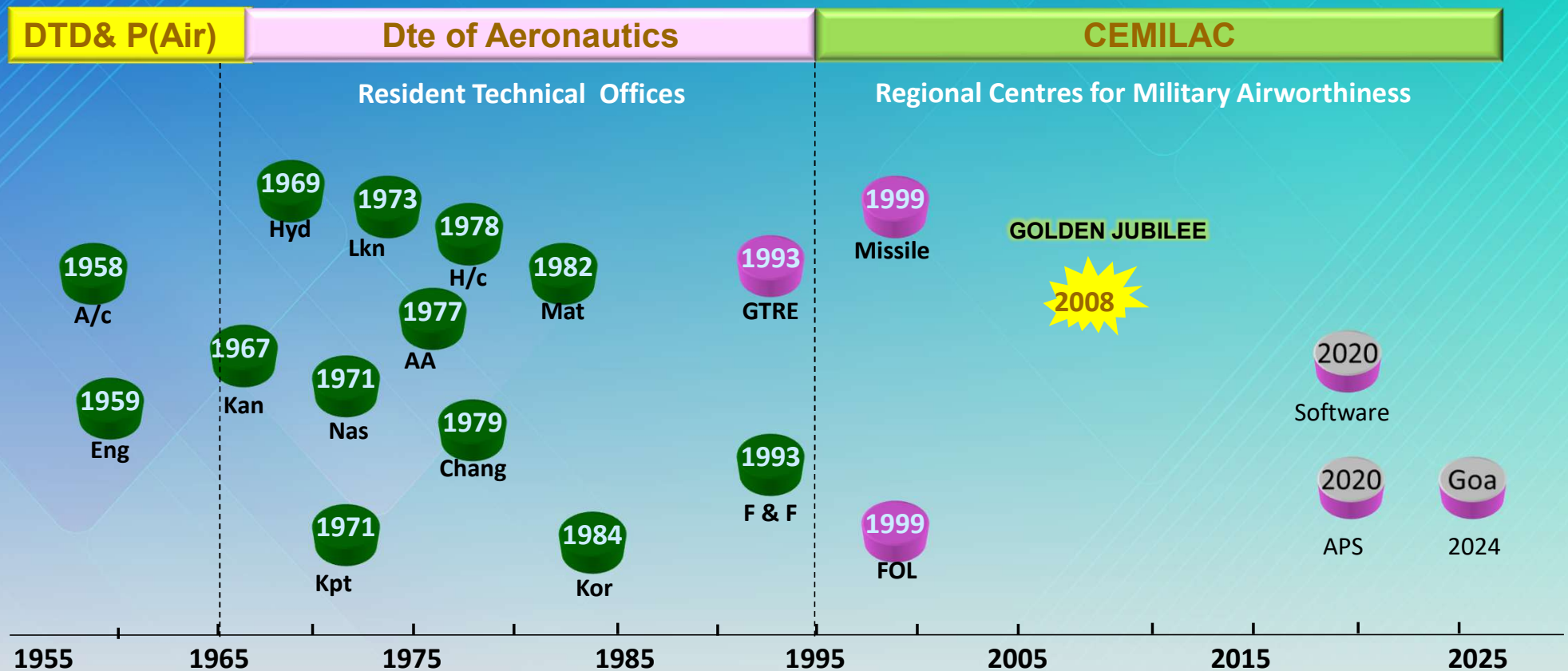
Certification Role



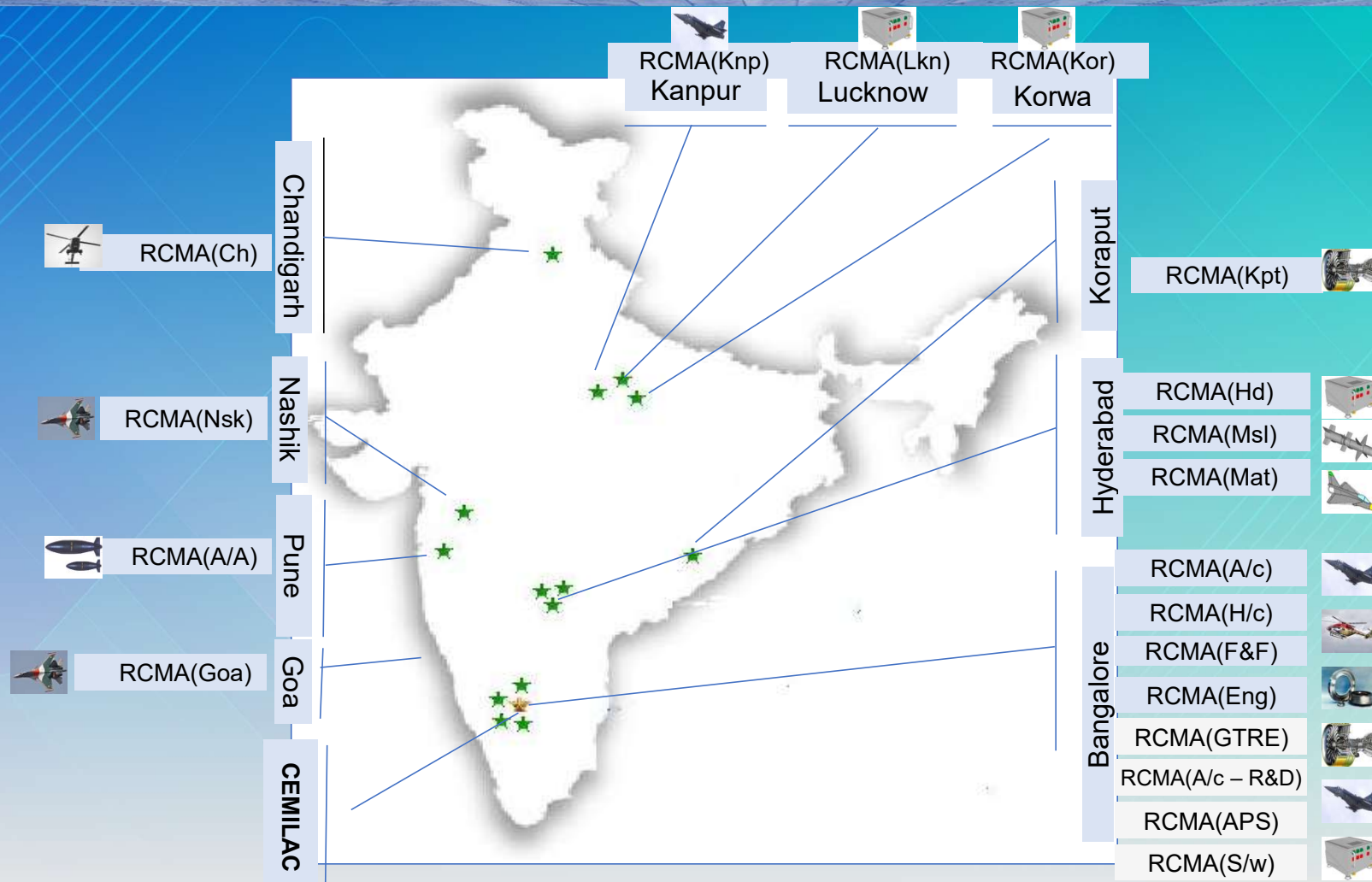
Spectrum of Certification Activities



CEMILAC Evolution (68 Years of certification legacy)

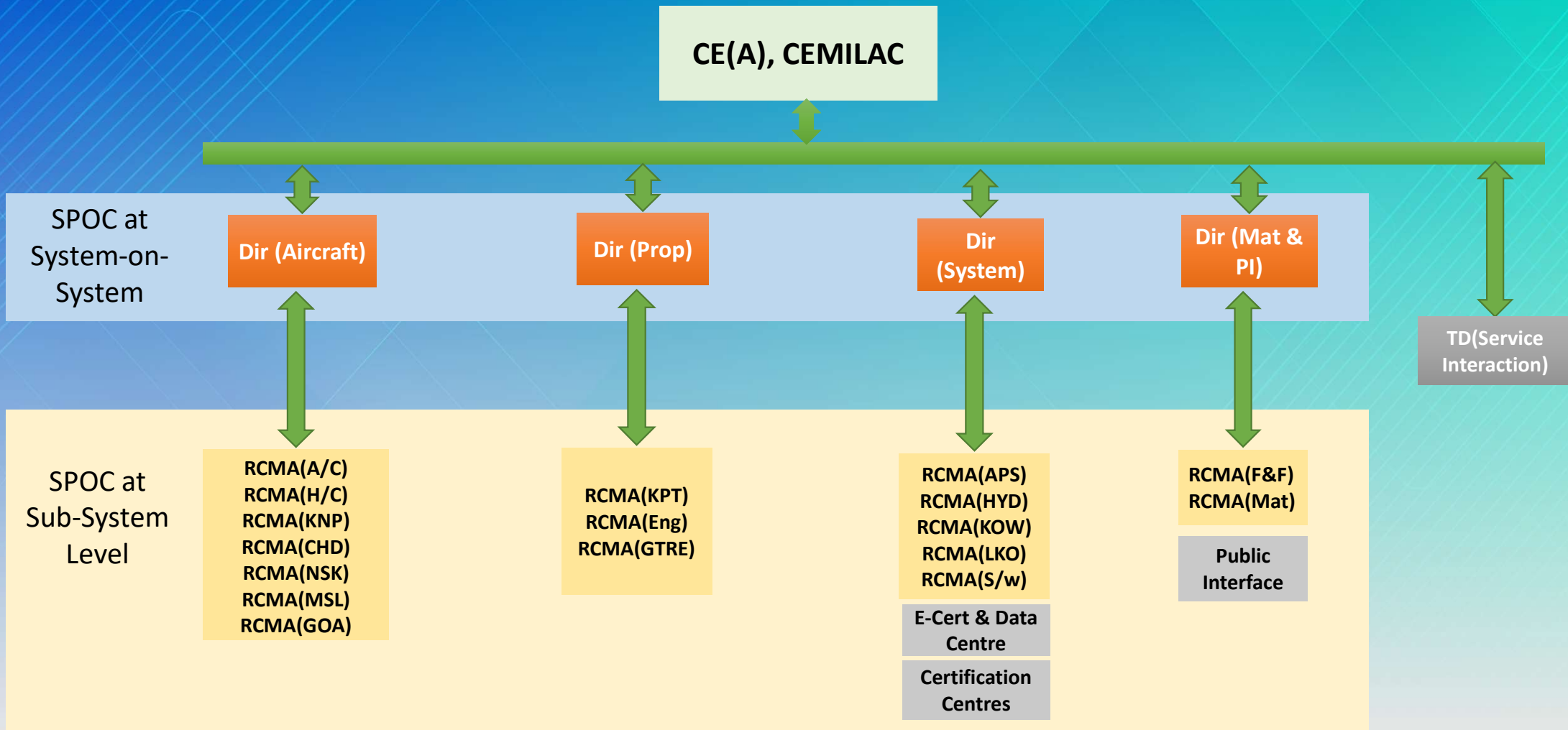


Pan India Certification Centres





Organization Chart





Certification Modernization & Reforms

Four Pillars of Airworthiness Certification

Leadership

Strong Leadership at the top demanding & demonstrating commitment to Safety and Airworthiness

Independence

Thorough independence in the regulatory regime in the setting and implementation of safety, airworthiness policy & regulation

AIRWORTHINESS

Leadership

Independence

Human Resource

Simplicity

Human Resource

Focus on the people in the delivery of high standards of safety & airworthiness, not just on process and paper

Simplicity

Regulatory structure, process and rules must be simple and straight forward for everyone to understand

CEMILAC Strives to uphold these Principles



Major Reforms by CEMILAC for Ease of Doing Business (EoDB)

Simplify Certification Procedures
Streamline Certification Process
Uniformity among RCMAs



DDPMAS Revision 1.0

Organization Restructuring

Outreach Programmes

Resource Buildup

Handhold MSMEs
Delegation
Ensure Accountability



Design Orgn. Approval Scheme

Specialized Certification Centres

E-Certification Portal & Data Centre

Indian Military Airworthiness Procedure (IMAP-2023)

Support Export
Automate Certification
Decentralization and Delegation

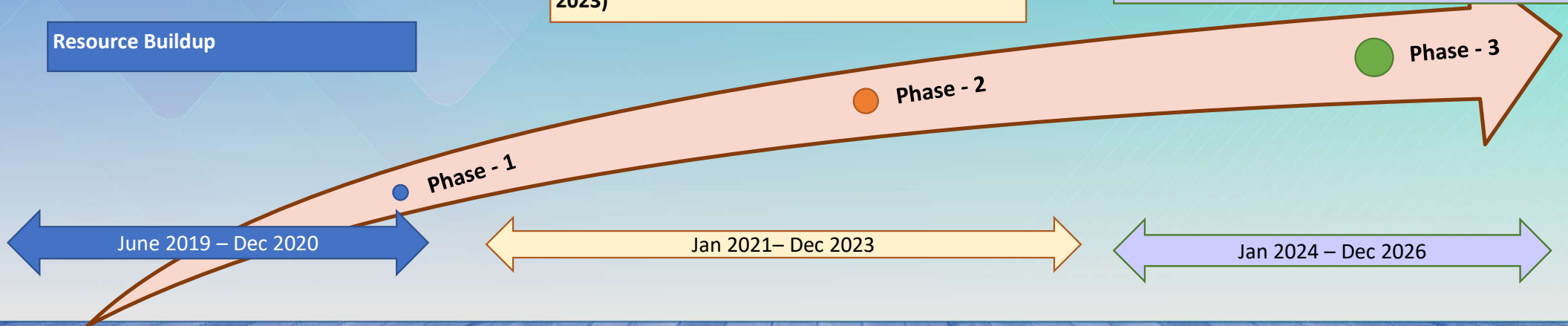


Mutual Recognition

Dedicated Vertical for Exports

Designated Engg Representative (DER)

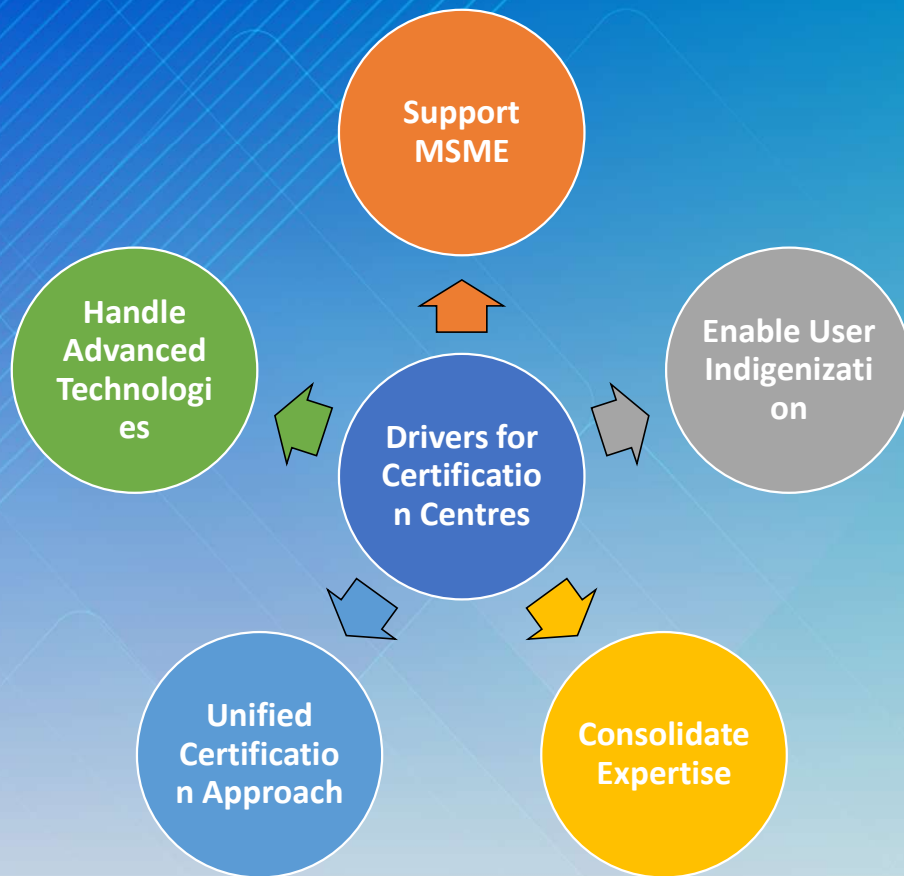
E-Certification Portal : Phase - 2



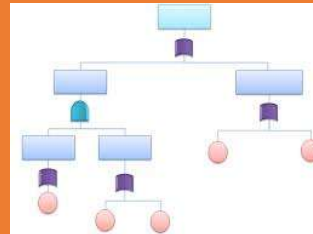
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Specialized Certification Centres

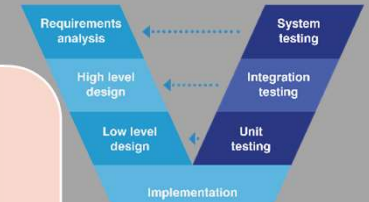


Centre for Safety, Reliability & Maintainability (SRM)

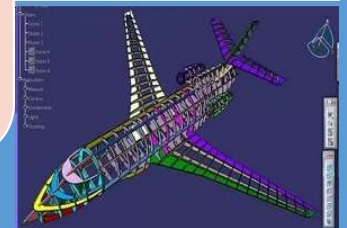


Centre for CEH Certification

Centre for Software Certification



Specialised Certification Centres



Centres for Aeromechanical & Structures (Being Planned)

Designated Engineering Representatives

Non-intrusive Certification

Apt use of retired experts

Fast-track Certification

Mutual Recognition

**CEMILAC will have more
time for core task**

**Outsourcing of Non-Critical
activities**

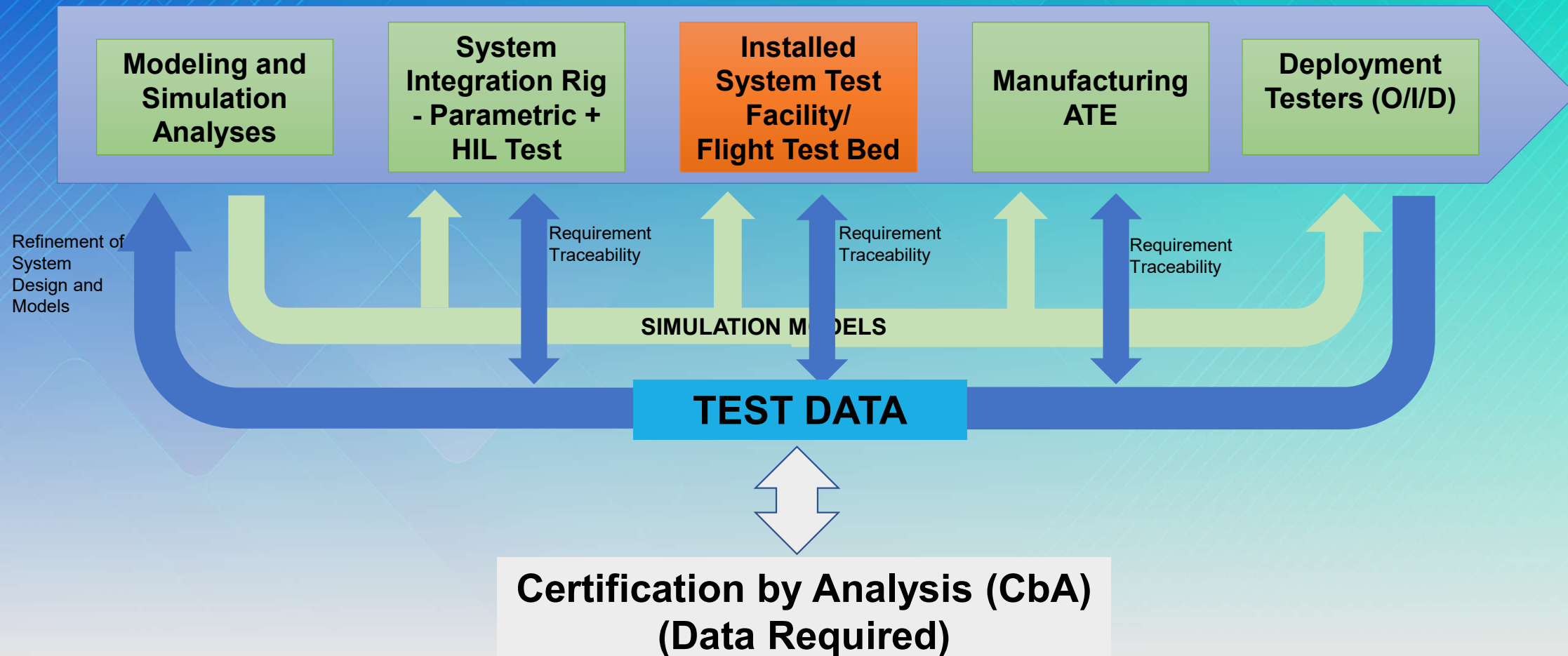
More transparency

Apt use of e-portal

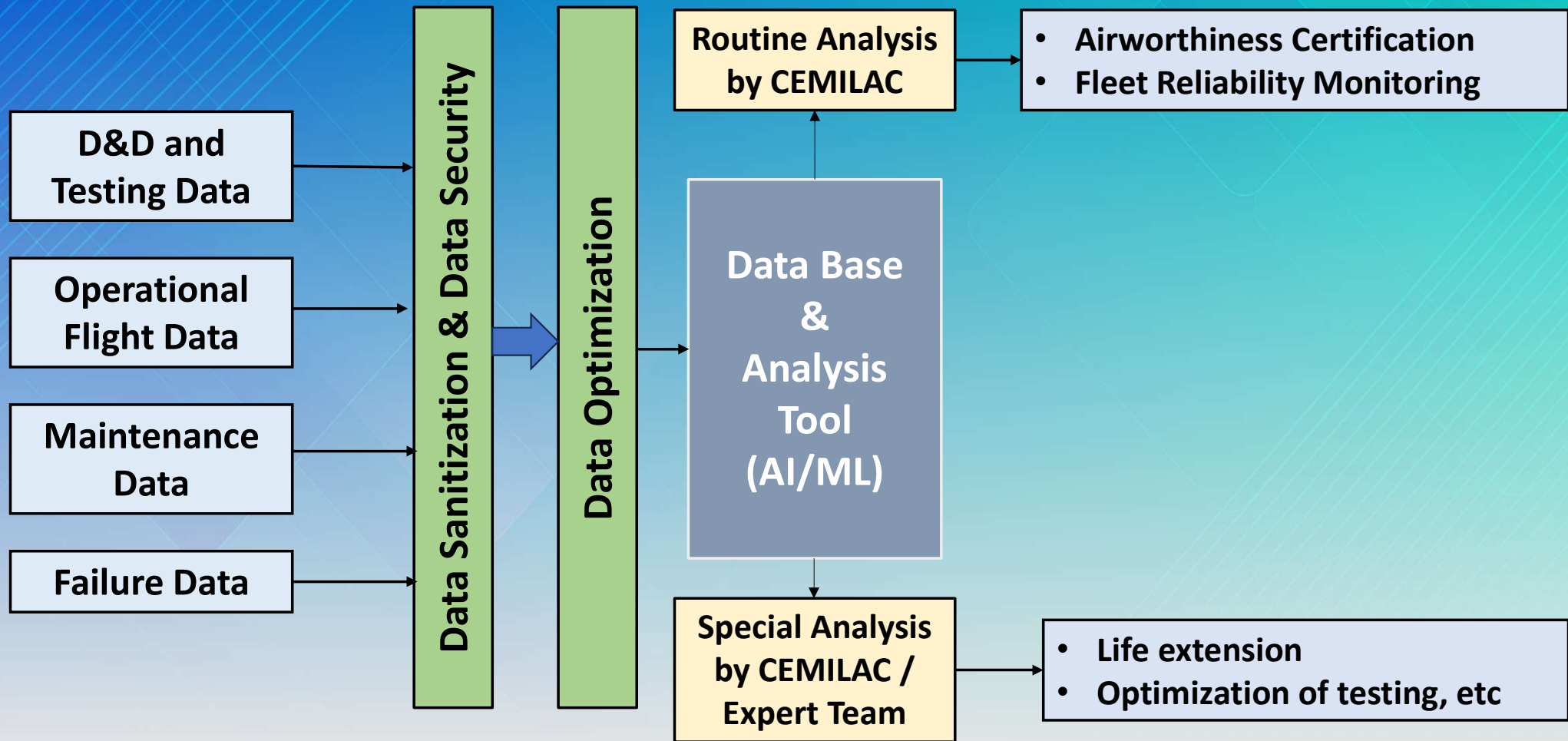
Expedite delivery to Armed Forces

Certification by Analysis

Means to Fast track Airworthiness Decision Making



Enabler for Certification by Analysis





PART – D

Mutual Cooperation : Need and Plan



Airworthiness Assurance Level (AAL)

AAL is a **quantitatively** measure of any airborne product's compliance to airworthiness

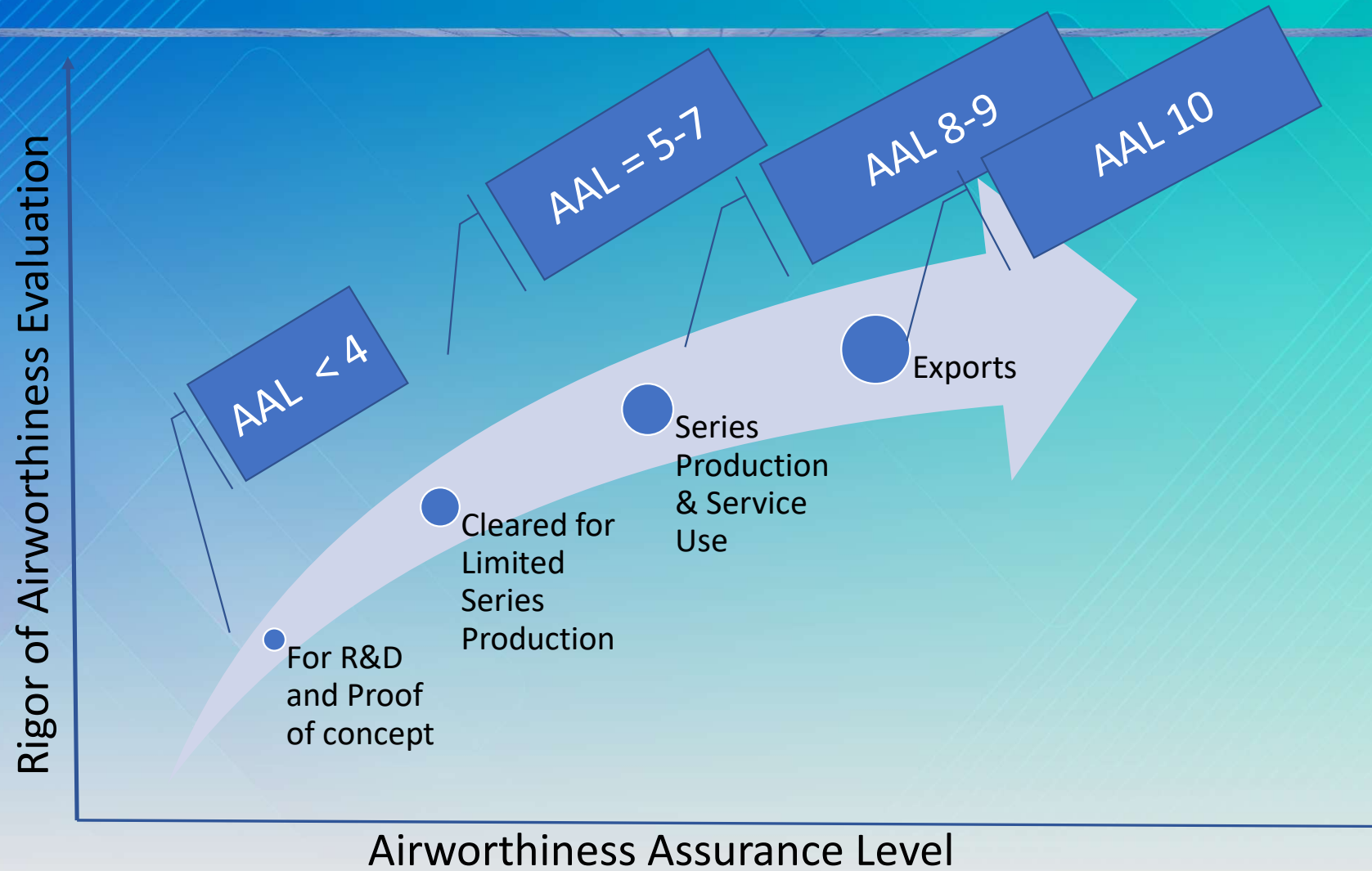
AAL **ensures objectivity** in certification as compared to subjectivity

Higher the AAL, more detailed are the **rigor of analysis, testing and documentation**

AAL is arrived based on a common criteria involving the following:

- A means for providing privileges under DOAS
- A means to evaluate technical capability of an Organization (AAL can help evaluate **TI**)
- Define scope for DER coverage

Airworthiness Assurance Level





Need for Mutual Cooperation

Many Joint Venture / Co-Development Projects between Indian Industry and Foreign OEMs

- **Surveillance Platforms**
- **Aero Engines Development**

Harmonization of Certification Activities to avoid duplication of work for many Foreign Acquisitions by Indian Armed Forces

Pave way for Indian Exports

Jointly Working on certification of futuristic technologies



Enabler for Mutual Cooperation

Indian Govt. has made provisions in IMAP-23 / IMTAR-21 for Mutual Recognition

CEMILAC ready to adopt EMAD-R and MAR as a means for mutual recognition

CEMILAC conducts 'International Conference on Military Airworthiness' as a biannual event



Thank You

Looking forward to hosting you all in India

Contact details

The Chief Executive (Airworthiness)
Centre for Military Airworthiness & Certification
Ministry of Defence, India
Phone : +91 80 25121001
Email : chief.cemilac@gov.in



MILITARY AIRWORTHINESS CONFERENCE



8 & 9 October
The Hague, The Netherlands

Hosted by



#MAC25



National
Defence

Défense
nationale



CANADIAN
ARMED FORCES

Risk Management and the Canadian Military Airworthiness Program

Martin Breton

Director Technical Airworthiness and Engineering Support

Canada



Outline

- ➔ Canadian Military Airworthiness Program Overview
- ➔ Canadian Military Airworthiness Risk Management Process
- ➔ Airworthiness Risk Management as an operational enabler





Canadian Military Airworthiness Program Overview

- ➔ Aeronautics Act requires regulation and supervision of military and civil aviation in Canada
- ➔ Implementation is a legal responsibility
- ➔ Minister of Transport is responsible for civil aviation
- ➔ Minister of National Defence is responsible for military aviation





Airworthiness Program Authorities

- ➔ Airworthiness Authority
 - ➔ Operational Airworthiness Authority
 - ➔ Technical Airworthiness Authority
 - ➔ Airworthiness Investigative Authority





Canadian Military Airworthiness Program Overview



Canadian Military Airworthiness Program recognized by:

- NATO
- Australia
- France
- New Zealand
- United Kingdom
- US National Airworthiness Council

Canadian Airworthiness Program is not EMAR based, but comparable

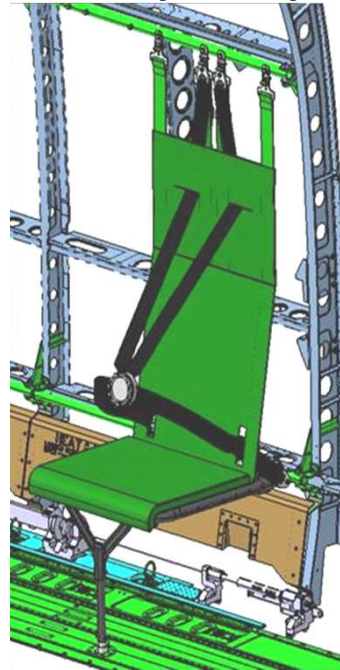


Military vs Civilian Airworthiness

Civilian Safety



Military Safety



Emergency Safety



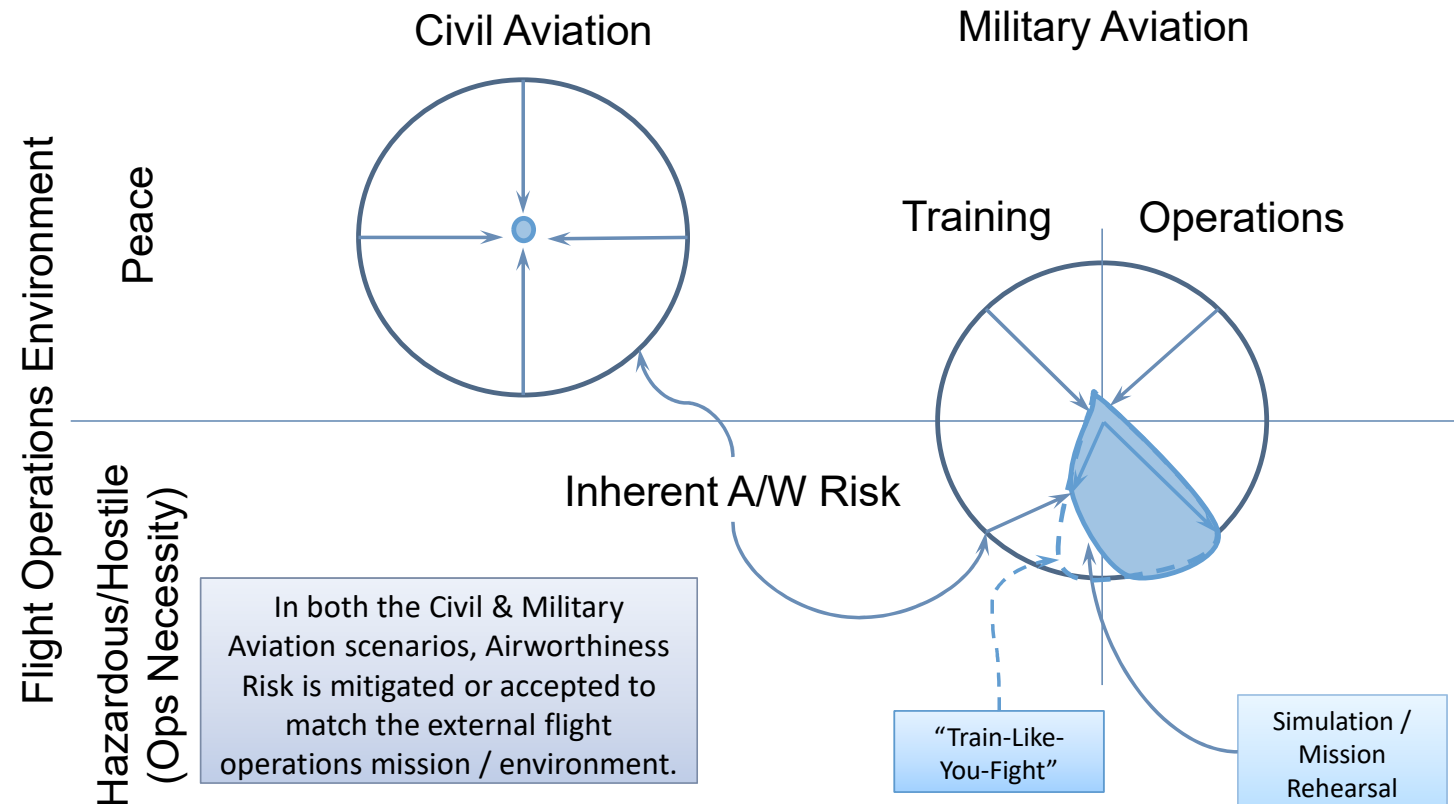
Key difference between military and civilian airworthiness programs is inherent need to balance airworthiness with the inherent military operation ambient risk



The need for Airworthiness Risk Management

Operating within airworthy baseline is not always possible or desirable in military operations

Management of airworthiness risk aims to find optimal balance between operational imperative and safety





Canadian Airworthiness Risk Management Process

- ➔ Continuous process to detect, assess and control risk associated with military aviation.
- ➔ Initiated when Acceptable Level of Safety (ALOS) cannot be satisfied
- ➔ Monitoring and reporting continues until situation returns to ALOS
- ➔ Types of Risk
 - ➔ Airworthiness
 - ➔ Survivability
 - ➔ Operational



Airworthiness Risk Management Process

1) Hazard Identification

- Hazard Condition, causes and effects

2) Risk Assessment

- Hazard Severity and Hazard Probability = Risk Index

3) Risk Control Plan

- Mitigation actions
- responsibilities,
- timelines
- residual risk

HAZARD SEVERITY			CATEGORY				
			A	B	C	D	E
PROBABILITY			Catastrophic	Hazardous	Major	Minor	Negligible
LEVEL	1	Frequent	A1 Extremely High	B1 Extremely High	C1 Medium	D1 Low	E1
	2	Probable	A2 Extremely High	B2 High	C2 Low	D2	E2
	3	Remote	A3 High	B3 Medium	C3	D3	E3
	4	Extremely Remote	A4 Medium	B4	C4	D4	E4
	5	Extremely Improbable	A5	B5	C5	D5	E5

Acceptable Level of Safety



Airworthiness Risk Management Process

4) Approval and Acceptance

- TAA and OAA concurrence with Risk Control Plan
- Acceptance of risks is ultimately an operational command decision
- Level of authority to accept risk depends on risk index

5) Tracking

- Ensures mitigation plan is executed per timelines

6) Regulatory oversight

- Annual review boards, scheduled audits, central database

Current Risk Index	Operational Airworthiness Approval Authority	Operational Command Risk Acceptance Authority ¹
Extremely High	OAA	Level 1 Commander (Comd RCAF or equivalent)
High	Senior Operational Airworthiness Manager (SOAM)	Operational Commander (Comd 1 or 2 Cdn Air Div, or equivalent)
Medium	Divisional Operational Airworthiness Manager (DOAM) (fleet dependent)	Operational Headquarters Director (1 or 2 Cdn Air Div Director or equivalent)
Low	Divisional Operational Airworthiness Manager (DOAM) (fleet dependent), A4 CE, A4 Maint	
Acceptable Level of Safety (ALOS)	Fleet SSO	Fleet SSO
Note 1: In cases where a risk applies to multiple Operational Command Risk Acceptance Authorities, the risk may be accepted by RCAF authorities however, concurrence from the other equivalent authorities should be sought prior to accepting the risk.		



Airworthiness Risk Management Process

Products & Timeline:

- Airworthiness Impact Assessment - immediate
- Risk Alert Notification (RAN) – within hours
- Airworthiness Risk Alert (ARA) < 24 hours to OAA staff
< 48 hours to Operational Command Risk
Acceptance Authority (OCRAA)
- Record of Airworthiness Risk Management (RARM) < 14 Days



Airworthiness Risk Management Process

Risk Management Team (RMT):

- ➔ Senior Design Engineer;
- ➔ Engineering SMEs for any affected systems;
- ➔ Technical Authority/Operational Authority representatives depending on level of assessed risk;
- ➔ For any issue with a potential Operational risk control activity or Operational impact, the RMT must include an operational representative familiar with the aircraft and an operational headquarters representative;
- ➔ For any issue with a potential impact on RCAF Maintenance operations, the RMT must include an A4 Maintenance representative from the operational headquarters;
- ➔ For any issue with a component of human interaction with the aircraft, such as but not limited to: occupant safety, emergency egress, pilot/aircrew workload, Aircraft Flight Manuals etc., the RMT must include Human Factors Engineering;



Airworthiness Risk Management as Operational Enabler

- Structured risk management is critical to allow informed decisions by commanders based on:
 - Clear understanding of Risk Index
 - Relative mission priority vs safety
 - Environmental Context
 - Eg peacetime vs emergency
- Can help match risk to environment to avoid:
 - Unnecessary risk acceptance; or
 - Overly conservative approach
- A word about Op Necessity





Examples

- Change in operational condition
 - Radalt on SAR helicopter identified as “non-radio tolerant” to 5G C-band interference
- New mission requirement
 - Uncertified system installed temporarily on an aircraft
 - Eg. Door gun installation on helicopter to support deployed operation
- Op Necessity
 - Eg. Evacuation, Emergency Search and Rescue



In Conclusion

- Airworthiness requirements provide the baseline for safety
- In service, airworthiness baseline does not change;
 - Not airworthy = Risk
- Quantifying and managing airworthiness risks enables continued operations when “airworthy” baseline cannot be satisfied due to meet military requirement
- Acceptance of risk is an operational decision, but structured airworthiness risk management avoids unnecessary risks or overly conservative approach.
- Common risk management process and terminology amongst allied nations could be enabler
 - AW in times of conflict
 - Expedited release to service of new capabilities



Questions





National
Defence

Défense
nationale



CANADIAN
ARMED FORCES

Risk Management and the Canadian Military Airworthiness Program

Martin Breton

Director Technical Airworthiness and Engineering Support

Canada



Outline

- ➔ Canadian Military Airworthiness Program Overview
- ➔ Canadian Military Airworthiness Risk Management Process
- ➔ Airworthiness Risk Management as an operational enabler





Canadian Military Airworthiness Program Overview

- ➔ Aeronautics Act requires regulation and supervision of military and civil aviation in Canada
- ➔ Implementation is a legal responsibility
- ➔ Minister of Transport is responsible for civil aviation
- ➔ Minister of National Defence is responsible for military aviation





Airworthiness Program Authorities

- ➔ Airworthiness Authority
 - ➔ Operational Airworthiness Authority
 - ➔ Technical Airworthiness Authority
 - ➔ Airworthiness Investigative Authority





Canadian Military Airworthiness Program Overview



Canadian Military Airworthiness Program recognized by:

- NATO
- Australia
- France
- New Zealand
- United Kingdom
- US National Airworthiness Council

Canadian Airworthiness Program is not EMAR based, but comparable

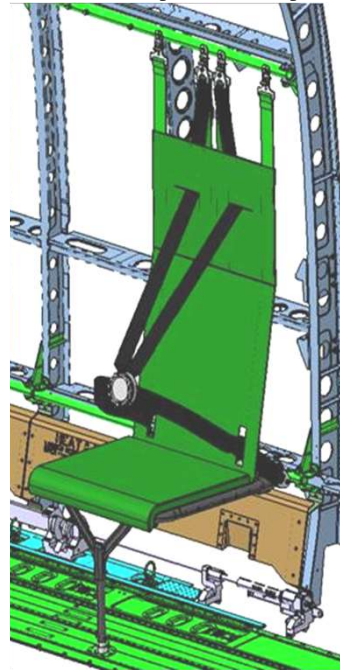


Military vs Civilian Airworthiness

Civilian Safety



Military Safety



Emergency Safety



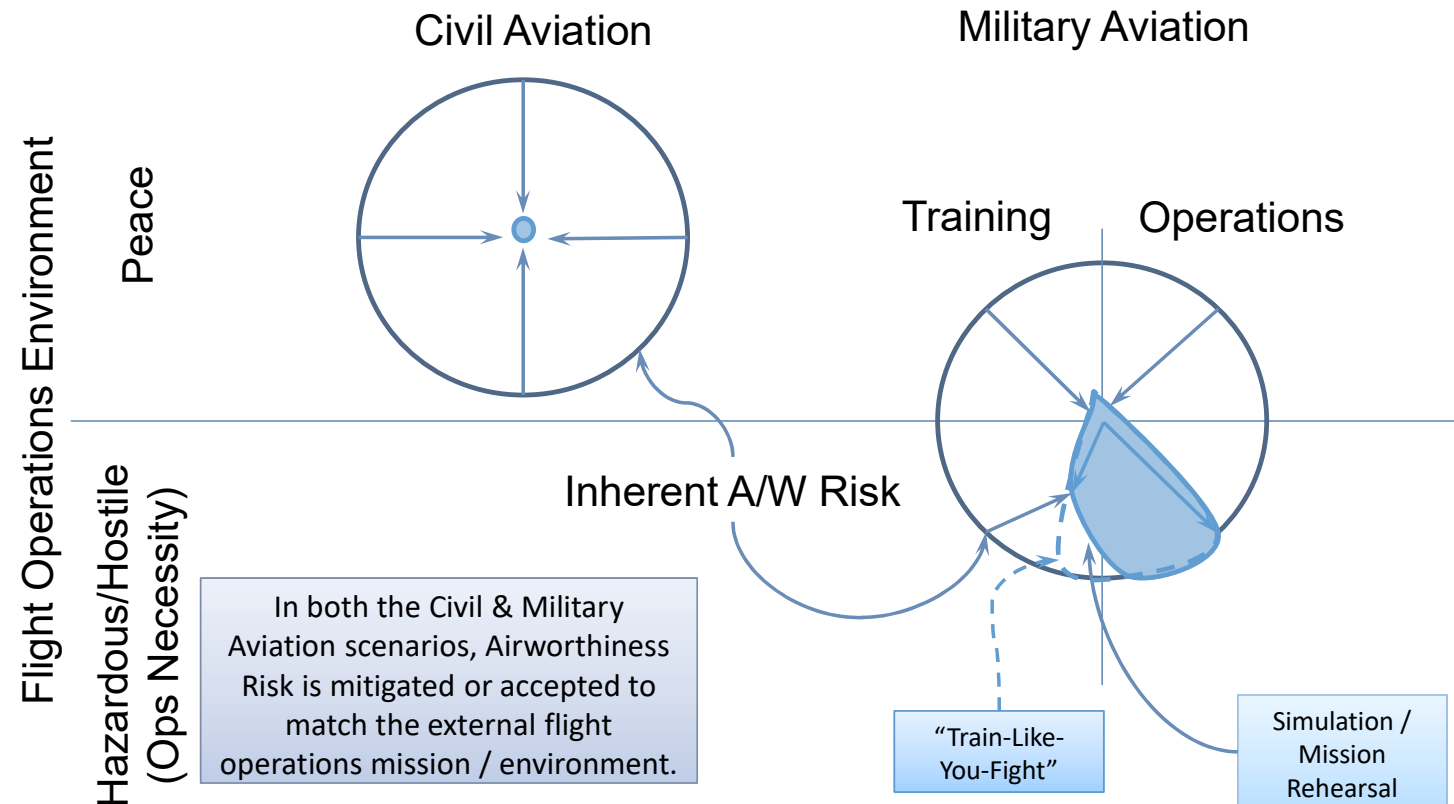
Key difference between military and civilian airworthiness programs is inherent need to balance airworthiness with the inherent military operation ambient risk



The need for Airworthiness Risk Management

Operating within airworthy baseline is not always possible or desirable in military operations

Management of airworthiness risk aims to find optimal balance between operational imperative and safety





Canadian Airworthiness Risk Management Process

- ➔ Continuous process to detect, assess and control risk associated with military aviation.
- ➔ Initiated when Acceptable Level of Safety (ALOS) cannot be satisfied
- ➔ Monitoring and reporting continues until situation returns to ALOS
- ➔ Types of Risk
 - ➔ Airworthiness
 - ➔ Survivability
 - ➔ Operational



Airworthiness Risk Management Process

1) Hazard Identification

- Hazard Condition, causes and effects

2) Risk Assessment

- Hazard Severity and Hazard Probability = Risk Index

3) Risk Control Plan

- Mitigation actions
- responsibilities,
- timelines
- residual risk

HAZARD SEVERITY			CATEGORY				
			A	B	C	D	E
PROBABILITY			Catastrophic	Hazardous	Major	Minor	Negligible
LEVEL	1	Frequent	A1 Extremely High	B1 Extremely High	C1 Medium	D1 Low	E1
	2	Probable	A2 Extremely High	B2 High	C2 Low	D2	E2
	3	Remote	A3 High	B3 Medium	C3	D3	E3
	4	Extremely Remote	A4 Medium	B4	C4	D4	E4
	5	Extremely Improbable	A5	B5	C5	D5	E5

Acceptable Level of Safety



Airworthiness Risk Management Process

4) Approval and Acceptance

- TAA and OAA concurrence with Risk Control Plan
- Acceptance of risks is ultimately an operational command decision
- Level of authority to accept risk depends on risk index

5) Tracking

- Ensures mitigation plan is executed per timelines

6) Regulatory oversight

- Annual review boards, scheduled audits, central database

Current Risk Index	Operational Airworthiness Approval Authority	Operational Command Risk Acceptance Authority ¹
Extremely High	OAA	Level 1 Commander (Comd RCAF or equivalent)
High	Senior Operational Airworthiness Manager (SOAM)	Operational Commander (Comd 1 or 2 Cdn Air Div, or equivalent)
Medium	Divisional Operational Airworthiness Manager (DOAM) (fleet dependent)	Operational Headquarters Director (1 or 2 Cdn Air Div Director or equivalent)
Low	Divisional Operational Airworthiness Manager (DOAM) (fleet dependent), A4 CE, A4 Maint	
Acceptable Level of Safety (ALOS)	Fleet SSO	Fleet SSO
Note 1: In cases where a risk applies to multiple Operational Command Risk Acceptance Authorities, the risk may be accepted by RCAF authorities however, concurrence from the other equivalent authorities should be sought prior to accepting the risk.		



Airworthiness Risk Management Process

Products & Timeline:

- Airworthiness Impact Assessment - immediate
- Risk Alert Notification (RAN) – within hours
- Airworthiness Risk Alert (ARA) < 24 hours to OAA staff
< 48 hours to Operational Command Risk
Acceptance Authority (OCRAA)
- Record of Airworthiness Risk Management (RARM) < 14 Days



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 - Expedited release to service of new capabilities



Questions





MILITARY AIRWORTHINESS CONFERENCE



8 & 9 October
The Hague, The Netherlands

Hosted by



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SAFETY ENVIRONMENT AND WORTHINESS EXECUTIVE DIRECTORATE



الإمارات العربية المتحدة
وزارة الدفاع
الإدارة التنفيذية للسلامة والبيئة والجدارة



UAE Military Airworthiness Authority

UAE MAA introduction, activities and
futures challenges



08 & 09 of October, 2025

AGENDA



1. Introduction to UAE MAA



2. Military Airworthiness Regulation (UAEMAR)



3. Calidus Bader – National Strategic Programme



4. UAE MAA activities and future challenges



UNITED ARAB EMIRATES
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UNITED ARAB EMIRATES MILITARY AIRWORTHINESS AUTHORITY (UAE MAA)



UNITED ARAB EMIRATES
MINISTRY OF DEFENCE

- The United Arab Emirates Military Airworthiness Authority (**UAE MAA**) is the **military regulatory body** responsible for establishing, managing, and overseeing the **military airworthiness system** in UAE.
- The UAE MAA was **established in October 2020**.
- The UAE MAA was created to **strengthen the local aerospace industry and military operations**, creating the regulatory framework necessary to **export products designed and manufactured in the UAE**, as well as implement an international airworthiness standard within military operators.



In the UAE MOD, the Executive Directorate of Safety, Environment and Worthiness (SEW) is mandated to maintain the worthiness of military equipment

Mandate

- To protect **Defence personnel, environment, and operational capability** through effective and sustainable **safety and environment protection regulation, assurance, enforcement** and **independent investigations**

Functional roles and responsibilities

- Ensure a **safe and healthy working environment** for all Defence personnel through safety policymaking, regulations and assurance to **prevent physical and mental injuries** in the workplace, including on operations, and thus promote the wellbeing of Armed Forces personnel
- **Protect the environment** by aligning Defence environmental protection and sustainability regulations so far as is reasonably practicable with the national environmental protection legislation and sustainable development goals
- **Sustain and maximise operational capability** by ensuring that every capital item of land, sea and air equipment is designed, produced and maintained in a condition that is safe to operate
- **Conduct independent and impartial investigations into** all safety related fatalities, serious incidents and injuries, and losses of major capability to determine causal factors and make recommendations for regulatory improvements

Sub-Functions

Safety

Environment
Protection

Worthiness

Accident/Incident
Investigation &
Prevention

Mandate, Roles and Responsibilities, and Sub-Functions



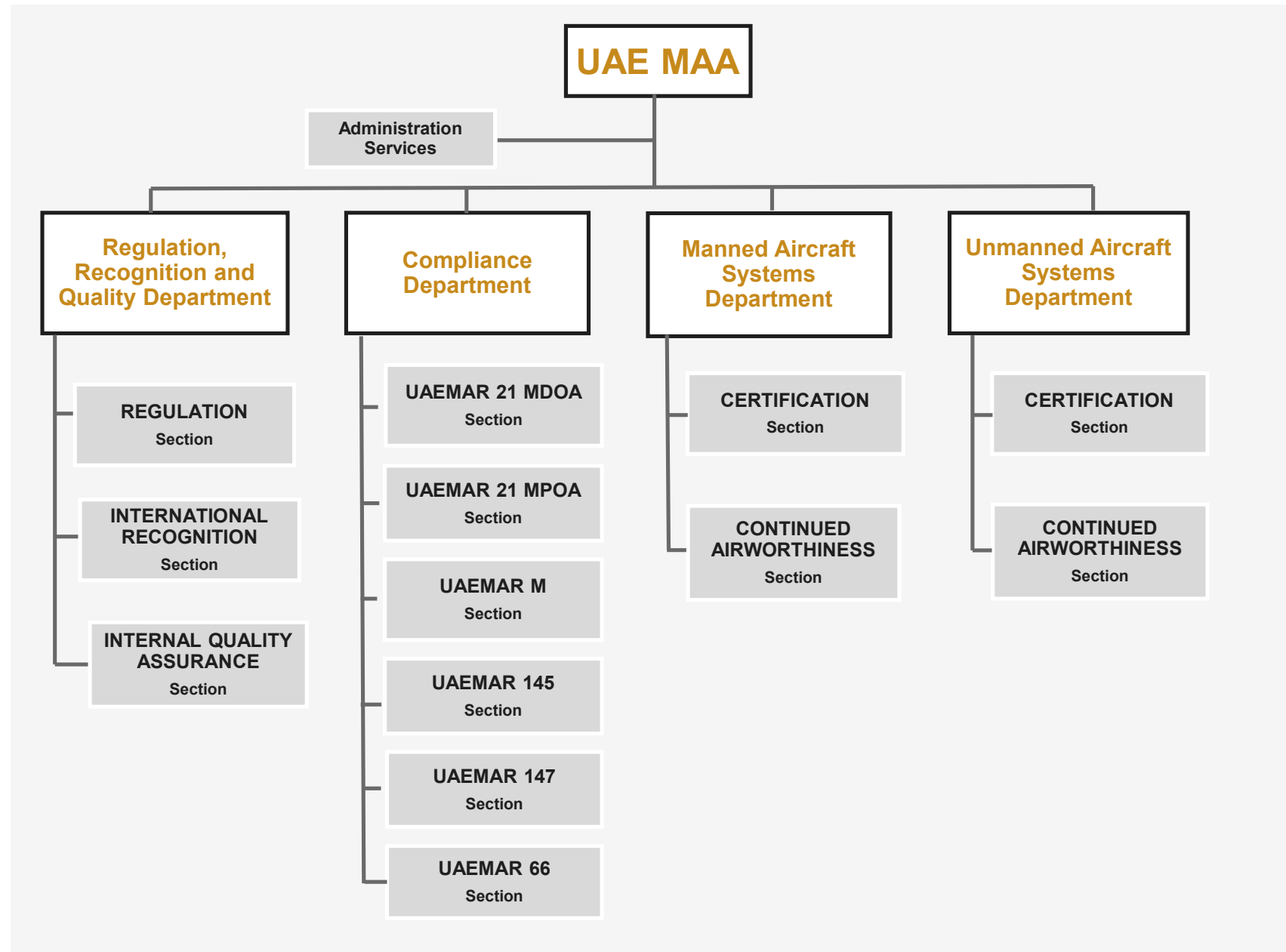
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MINISTRY OF DEFENCE

UAE MAA

MAA Organisational structure



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MINISTRY OF DEFENCE



Decrees numbers 26 and 13 issued in 2020. Establishing the UAE MAA and the UAEMAR

Main Roles of the UAE MAA

- Develop the UAEMAR
- Foster and monitor the compliance of the UAEMAR
- Issuance of the certificates under UAEMAR



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MINISTRY OF DEFENCE

Decree 26

Issued 2020

Established Worthiness Directorate in the Ministry of Defence



Decree 13

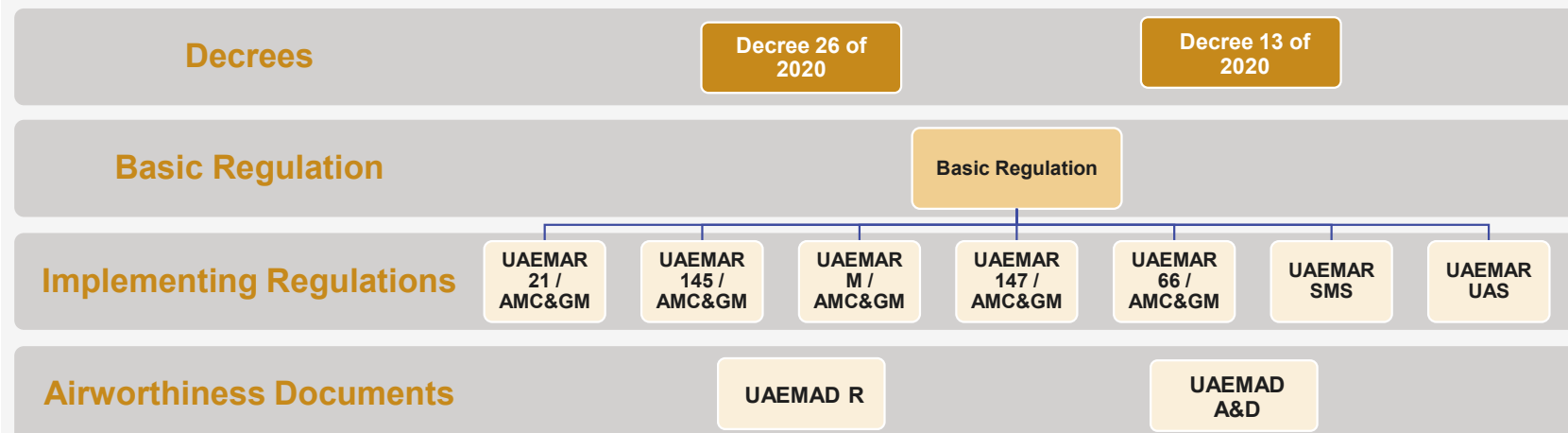
Issued 2020

Gives SEW the mandate to issue Airworthiness Regulations



Basic Regulation

Adopted from EASA EC216/2008, as amended
Top-level regulation for Military Airworthiness



Roles and responsibilities



- The primary responsibility of the UAE MAA is to **enhance and promote military aviation safety** through effective and up-to-date airworthiness **regulation** and by encouraging industry to deliver high standards of airworthiness.
- **Initial and Continued Airworthiness** (Design, Certification and Production) and **Continuing Airworthiness** (CAMO, AMO, MTO and MAML) is **governed by UAE MAA**, where operational activities are the responsibility of the operator.
- The role of a **technical body** within the UAE MAA is performed by a pool of international **Qualified Entities (QEs)**, which provide their services to the UAE MAA when technical expertise is needed in specific domains.
- UAE MAA set a precedent in the **Region** for building **sovereign aerospace capabilities under internationally recognised regulatory frameworks**.

AGENDA



1. Introduction to UAE MAA



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EMAR and Military Airworthiness

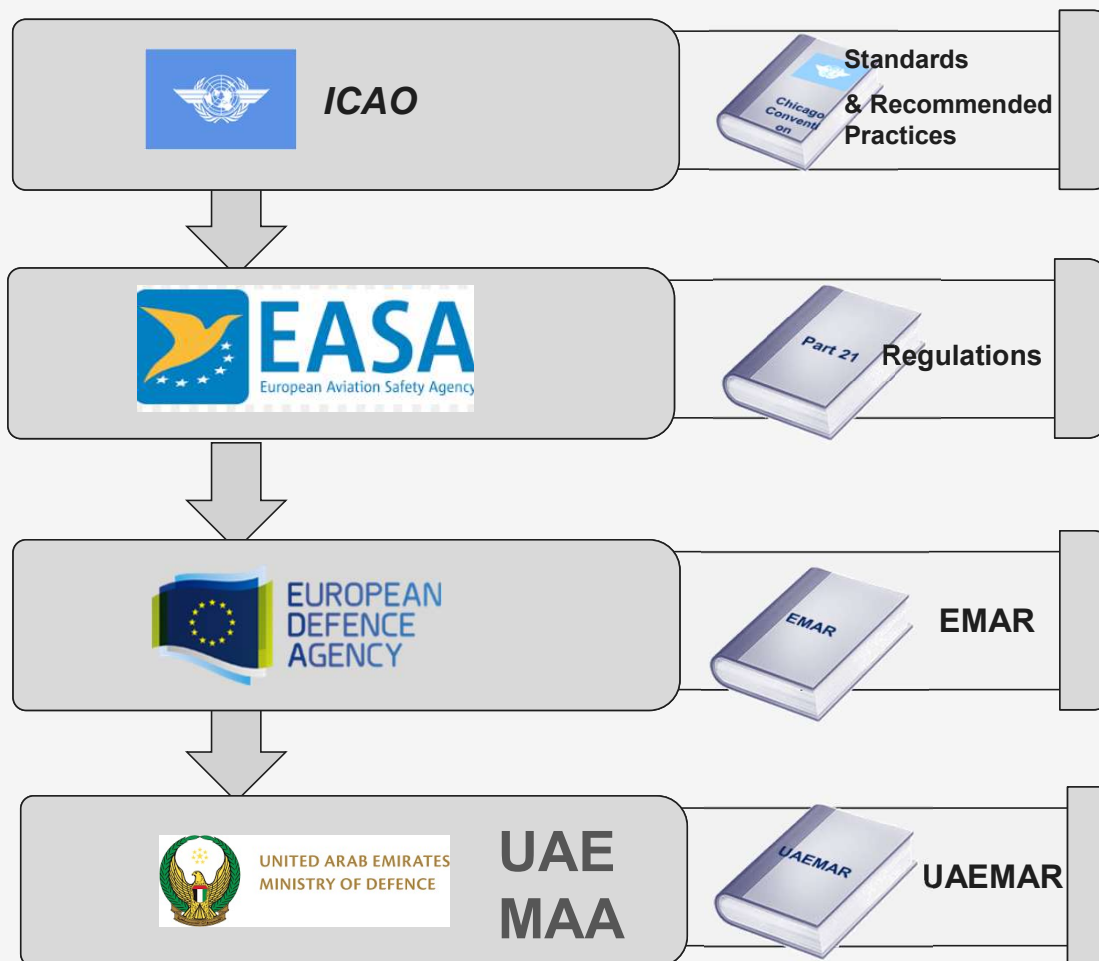
In military Airworthiness the assumed level of risk is usually higher according to the mission.

As civil as possible, as military as required.



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From civil to military



Military Airworthiness Regulation (UAEMAR)



DASR UAS: Defence Aviation Safety Regulations Unmanned Aircraft Systems from Australia

SORA: Specific Operations Risk Assessment



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UAEMAR Implementing Regulations	Adopted from
<u>Initial Airworthiness Regulation + AMC&GM</u> UAEMAR 21	EMAR 21
<u>Continuing Airworthiness Regulation + AMC&GM</u> - UAEMAR 145 - UAEMAR M - UAEMAR 66 - UAEMAR 147	- EMAR 145 - EMAR M - EMAR 66 - EMAR 147
<u>Unmanned Aircraft Systems</u> UAEMAR UAS	DASR UAS (+ EASA SORA Methodology)
<u>Aviation Safety Management System</u> UAEMAR SMS	Original Regulation (ICAO Doc 9859 Chapter 9 based)
<u>Military Airworthiness Documents</u> - UAEMAD Recognition - UAEMAD Acronyms & Definitions	- EMAD R - EMAD 1

AGENDA



1. Introduction to UAE MAA



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Strategic importance of the Calidus Programme

Calidus Bader is a light attack aircraft designed & built in the UAE, in process to obtain Type Certificate under UAEMAR.



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Calidus Bader – National Strategic Programme

- **First** UAE-designed and produced **military aircraft**.
- **National strategic** project.
- Objective beyond certification:
 - Establish a **sustainable aerospace ecosystem**.
 - **Enable future capability to produce & export** advanced platforms.
- Positions the **UAE as a competitive player** in the global defence market.
- Builds foundations for **long-term industrial growth**.



The regulatory role in the Calidus Programme

UAE MAA Role:

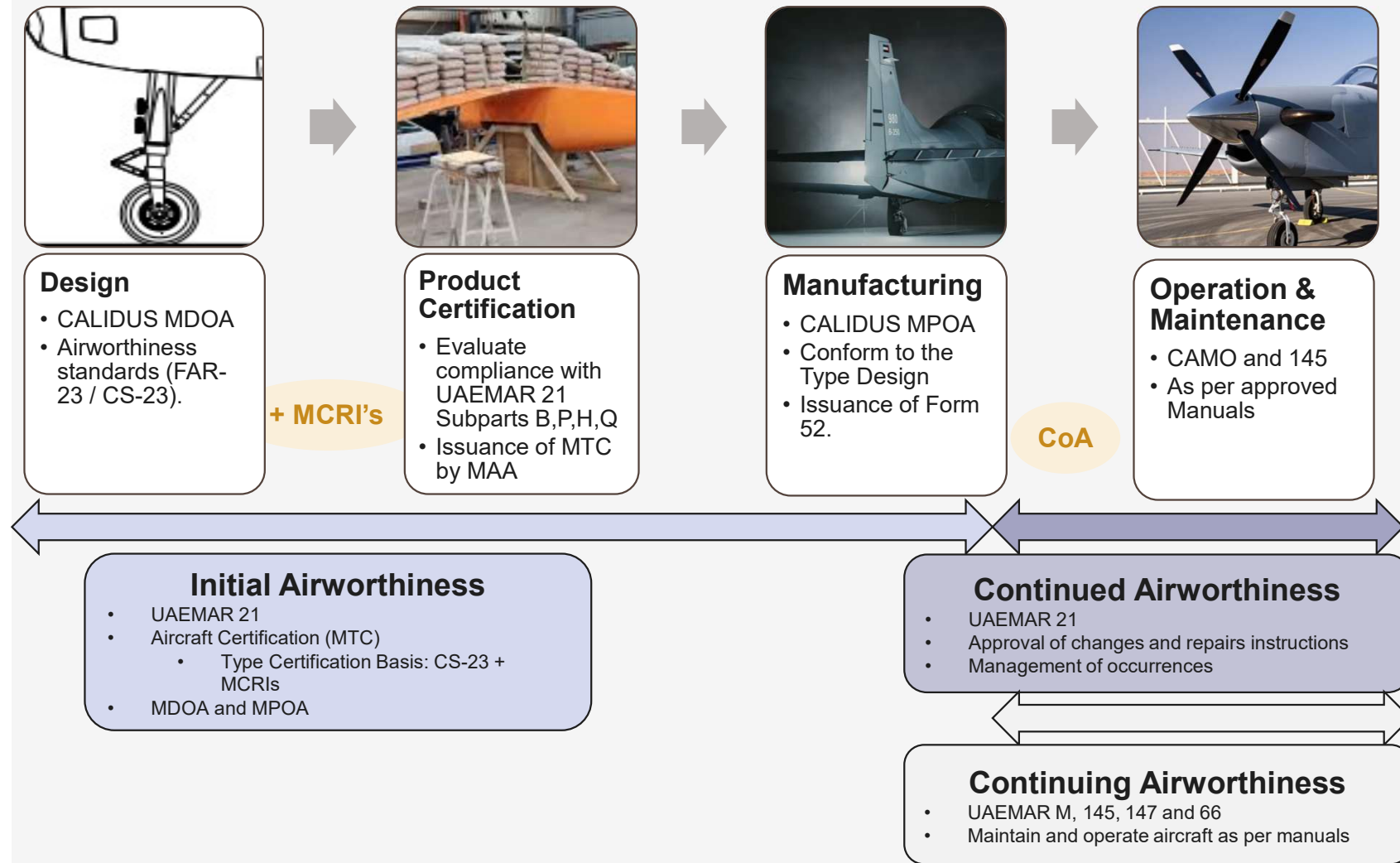
- Ensure consistency with **UAEMAR 21**
- Define Type Certification Basis (**FAR 23** + MCRIIs).
- Approve Certification Plan.
- Evaluate compliance evidence and conducts independent assessments.
- Issue permits, certificates, and approvals.
- **Final issuance of Type Certificate** once full compliance is demonstrated.



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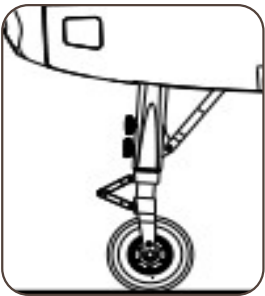


CALIDUS PROGRAMME



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MINISTRY OF DEFENCE

CALIDUS MDOA & MPOA

	
Design • CALIDUS MDOA • Airworthiness standards: CS-23 + MCRI's	Manufacturing • CALIDUS MPOA • Conform to the Type Design • Issuance of Form 52.

Goal

- Obtain MDOA/MPOA according to UAEMAR 21 Subpart J/G.

UAE MAA Key Actions

- Evaluation of internal procedures,
- Staff qualification review,
- Regular audits & surveillance for compliance & process effectiveness.

MDOA/MPOA Strategy

- Initial MDOA/MPOA with limitations.
- Planned expansion as maturity improves.

Qualified Entity Support (INTA)

- Technical expertise & compliance support in selected domains (MDOA).

INTA: National Institute of Aerospace Technology



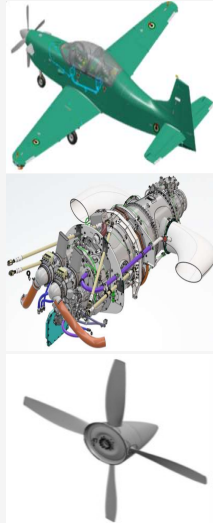
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PRODUCT CERTIFICATION UAEMAR 21



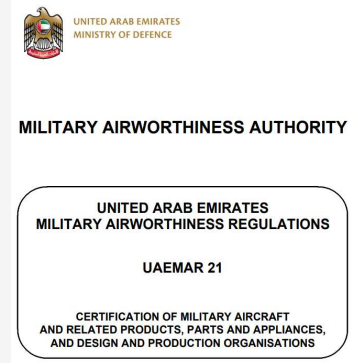
Product Certification

- Evaluate compliance with UAEMAR 21 Subparts B,P,H,Q
- Issuance of MTC by UAE MAA

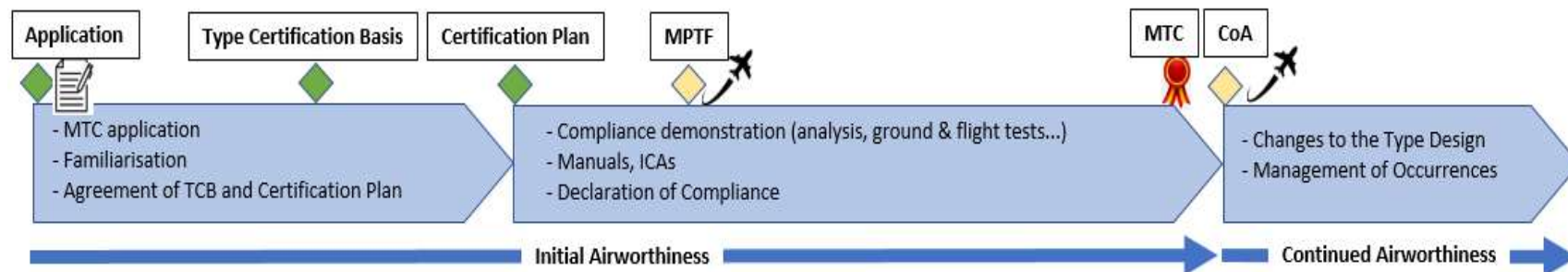


The certification of Military products and changes follows the **UAEMAR 21**, covering:

- Issuance of Military Type Certificates
- Approval of changes, repairs, and STCs
- Military Permits to Fly
- Continued Airworthiness
- Issuance of Airworthiness Certificates



Calidus Certification process under UAEMAR 21



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CONTINUING AIRWORTHINESS



Operation & Maintenance

- By CAMO and 145
- As per approved Manuals



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CAMO/UAEMAR 145

Goal

- Obtain CAMO/UAEMAR 145 according to UAEMAR M.

UAE MAA Key Actions

- Evaluation of internal procedures,
- Staff qualification review,
- Regular audits & surveillance for compliance & process effectiveness.



UAE MAA NATIONAL PROJECT



Lessons learned from the Calidus Programme (so far)

The implementation of UAEMAR through the Calidus programme demonstrates that:

- The **UAE MAA's proactive role** ensured a balance between regulatory oversight and industrial development.
- **Organisations approvals are not only a regulatory requirement but also a strategic enabler** for developing a national aerospace industry.
- **Alignment with the EMAR framework** enables the **UAE MAA** and approved National Organisations to be **recognised** by other **EMAR** implementing NMAAs



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AGENDA



1. Introduction to UAE MAA



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UNITED ARAB EMIRATES
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UAE MAA approach with introducing UAEMAR to legacy fleets

Legacy fleet are aircraft operated in the UAE MOD prior to November 2022.



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UAEMAR Scope

UAEMAR is applicable to:

- All new military products designed and/or manufactured in the UAE **after October 2020**.
- All new types of Military Manned Aircraft operated in the UAE **after November 2022**.
- **All Military Unmanned Aircraft systems** operated in the UAE.

UAE MAA strategy is to introduce the newest fleets under UAEMAR to ensure acceptable level of safety and proper oversight.

Legacy fleet entry factors

Introducing legacy fleet under UAEMAR depends on several **factors**.

1. Operators interest
2. Availability of documentation
3. Remaining service life
4. Cooperation of the certifying NMAA
5. Project feasibility
6. UAE MAA resource availability

CONTINUING AIRWORTHINESS



Operation & Maintenance

- By CAMO and 145
- As per approved Manuals



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Current Status:

❑ Organisations:

- 9 organisations approvals in progress (CAMO, AMO, MTO).
- **1st AMO approved on July 2025** for Non-destructive Test.

❑ Licenses:

- **100+ MAML applications** processed, including type rated and basic

Challenges

- Implementing **new airworthiness system** independent from the operator + OEM.
- Applicants with different backgrounds make **grandfathering rule** implementation a challenge.
 - A case by case approach.
- **Migration from legacy** requirements to UAEMAR.

CURRENT STATUS

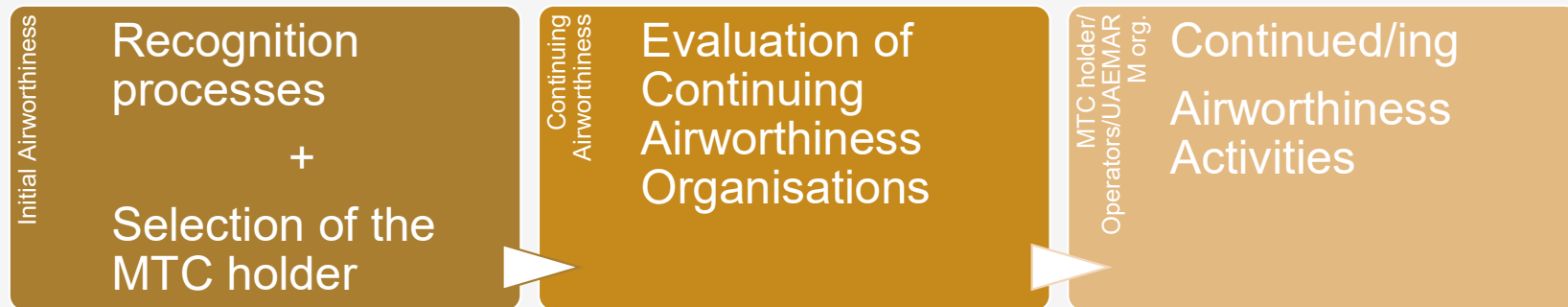


Legacy Fleets: Current Status

- Basic Regulation currently excludes legacy aircraft (except UAS).
- Operators plans to **introduce selected legacy fleets** in the coming years.
- UAE MAA is actively evaluating future CAMOs and UAEMAR 145, 147 & 66 licenses.

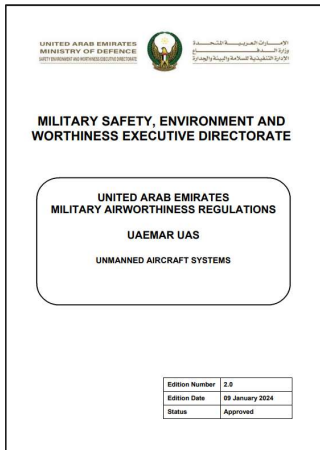
UAE MAA Key Actions

- Receive MTC Application from operators
- Evaluate Initial/Continued Airworthiness alongside Continuing Airworthiness
- Evaluating potential Recognition processes
- Perform audits and ongoing surveillance to ensure compliance and process implementation and effectiveness.



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UAS regulatory framework: UAEMAR UAS



DASR: Defence Aviation Safety Regulation (Australia)
EASA: European Union Aviation Safety Agency
SORA: Specific Operational Risk Assessment
UAEMAR: UAE Military Airworthiness Regulation
UAS: Unmanned Aircraft System
UASOP: UAS Operating Permit



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- Aligned with EASA regulation (derived from DASR UAS).
- Operation-oriented regulation, risk-based approach (example SORA 2.5).
- International best practices while addressing UAE operational needs.

UAS Categories



Open

- Low Risk
- Micro, Very Small and Small
- Max weight 25kg
- Non-weaponised



Specific

- Low to Medium Risk
- Type A: Risk assessment UASOP
- Type B: Standard Scenario user declaration

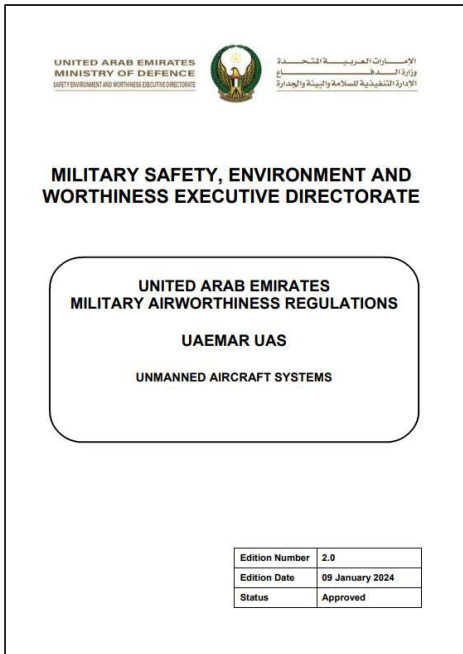


Certified

- High Risk
- Require UAEMAR compliance similar to manned aircraft

Adopting a progressive, risk-based approach aligned with EASA regulation

UAS CHALLENGES AND OPPORTUNITIES



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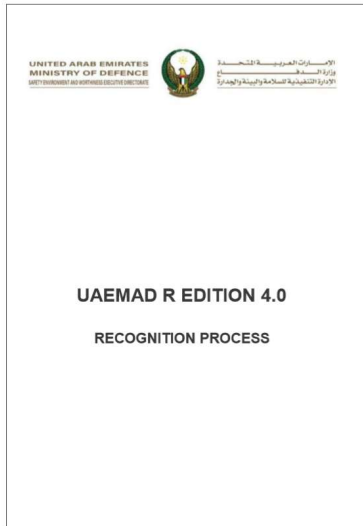
Challenges:

- **Legacy UAS** in medium/high-risk environments.
- **Market UAS** often lack documentation for “specific” category compliance.
- **Adapting EASA/DASA** frameworks to military/UAE context.
- **Technology** evolving faster than regulation.
- **Safe integration** into controlled airspace.

Opportunities:

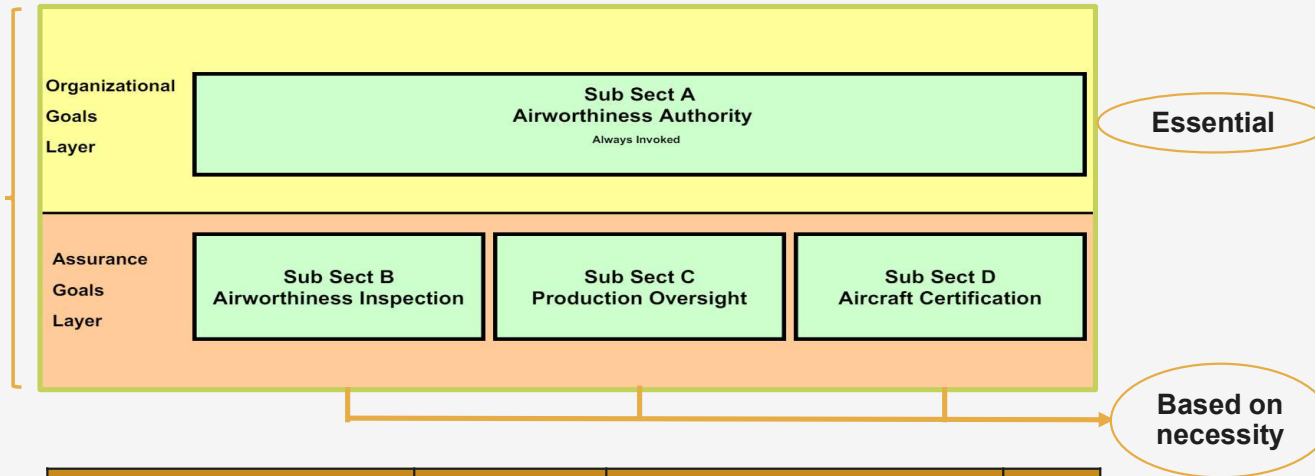
- **Collaboration & best practices:**
 - Enhance coalition between stakeholders
 - Mutual recognition
 - Adoption of global standards.
- **Regional leadership** in safe military UAS integration.

INTERNATIONAL RECOGNITION



UAEMAD R – Adopted from EMAD R Edition 3.1.

MARQs



UAE MAA RECOGNITION OF NMAAs

Certification bodies

COUNTRY	NMAA	CURRENT STATUS	Date
SPAIN	DGAM	Full Recognition Completed MARQ A, B, C, D	2025
FRANCE	DGA DSAE	MARQ A Recognised	2024
USA	USA NAC	Communications started	2024
CANADA	CTAA	Communications started	2025
CHINA	AVIC MEQAC	Full Recognition Completed MARQ A, B, C, D	2024

NMAAs RECOGNISING UAE MAA

COUNTRY	NMAA	CURRENT STATUS	Date
SPAIN	DGAM	MARQ A Recognised	2025
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USA	USA NAC	Communications started	2024

MARQs: Military Authorities Recognition Question set



UNITED ARAB EMIRATES
MINISTRY OF DEFENCE

UAE MAA PUBLIC WEBPAGE

www.mod.gov.ae

Regulations

Basic Regulation

Latest Document Baselines

UAEMAR BR 3.0 (08 November 2022)

Previous Baselines

UAEMAR BR 2.0 (15 March 2022)

UAEMAR BR 1.0 (01 March 2022)

Initial Airworthiness Regulation

Latest Document Baselines

UAEMAR UAS Edition 2.0 (09 January 2024)

UAEMAR UAS Edition 1.0 (01 January 2024)

ETP-2024-001_UAEMAR UAS OM Template Edition 1.0

Previous Baselines

UAEMAR UAS 1.0 (28 July 2022)

UAEMAR 21.1 (01 July 2022)

E-Services

Forms

UAEMAR Form 1 – Authorisation

UAEMAR Form 2 – Application

UAEMAR Form 4 – Acceptance

UAEMAR Form 12 – Application

UAEMAR Form 18a – Approval

UAEMAR Form 18b – Approval

UAEMAR Form 18c – Approval

Certificates

Military Airworthiness Authorities – Recognition

CORM-2023-001_Certificate of Recognition of DGAM by UAE MAA_Signed

CORM-2023-002_Certificate of Recognition of DGA by UAE MAA_Signed

Civilian Airworthiness Authorities – Recognition

CAAR-2023-001_FAA Recognition of Authority v1.0_Signed

CAAR-2023-002_TCCA Recognition of Authority v1.0_Signed

CAAR-2023-003_EASA Recognition of Authority v1.0_Signed

Promotion

LFT-2023-001 v1.0 MAA promotion for DAS 3rd UAE Worthiness & Safety Conference 2023

PIL-2023-001_Pill 1 Airworthiness_ENG v1.0 Published

PIL-2023-002_Pill 2 UAS_ENG v1.0 Published

PIL-2023-003_Pill 3 Maintenance_ENG v1.0 Published

PIL-2023-004_Pill 4 Design Organisation_ENG v1.0 Published

PIL-2023-005_Pill 5 MPOA_ENG v1.0 Published

PIL-2023-006_Pill 6 MTO_ENG v1.0 Published

PIL-2024-001_Pill 7 CAMO_ENG v1.0 Published

PIL-2024-002_Pill 8 AMO_ENG v1.0 Published



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UNITED ARAB EMIRATES
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الإمارات العربية المتحدة
وزارة الدفاع

Thank you

Contact: uaemaa.recognition@mod.gov.ae



MILITARY AIRWORTHINESS CONFERENCE



8 & 9 October
The Hague, The Netherlands

Hosted by



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Autoridad Aeronáutica de Aviación de Estado



DIAN



Military Airworthiness Authority (MAWA)



We work for State Aviation Security

AGENDA

1. Organization / Structure / Areas
2. Roadmap
3. Initial Airworthiness
4. Lessons Learned
5. Conclusions



We work for State Aviation Security

Organization / Structure / Areas

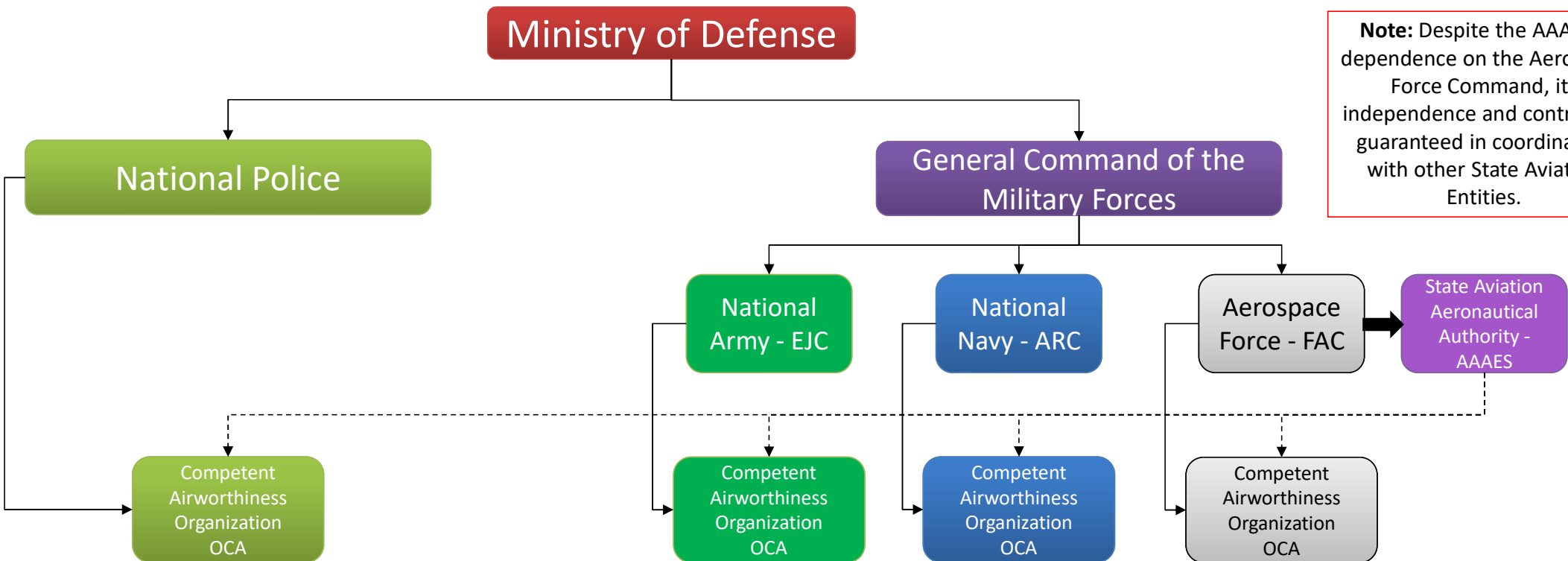


We work for State Aviation Security

1. Organization

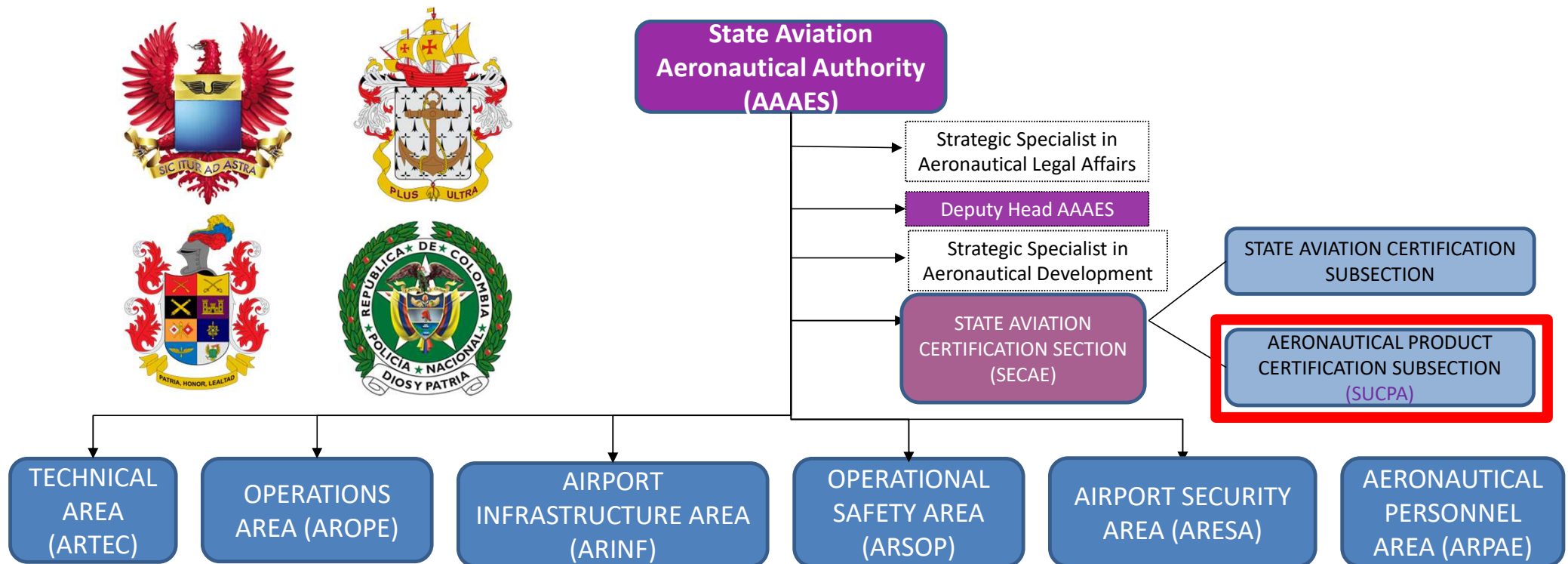


Note: Despite the AAAES's dependence on the Aerospace Force Command, its independence and control are guaranteed in coordination with other State Aviation Entities.



We work for State Aviation Security

1. Structure / Areas



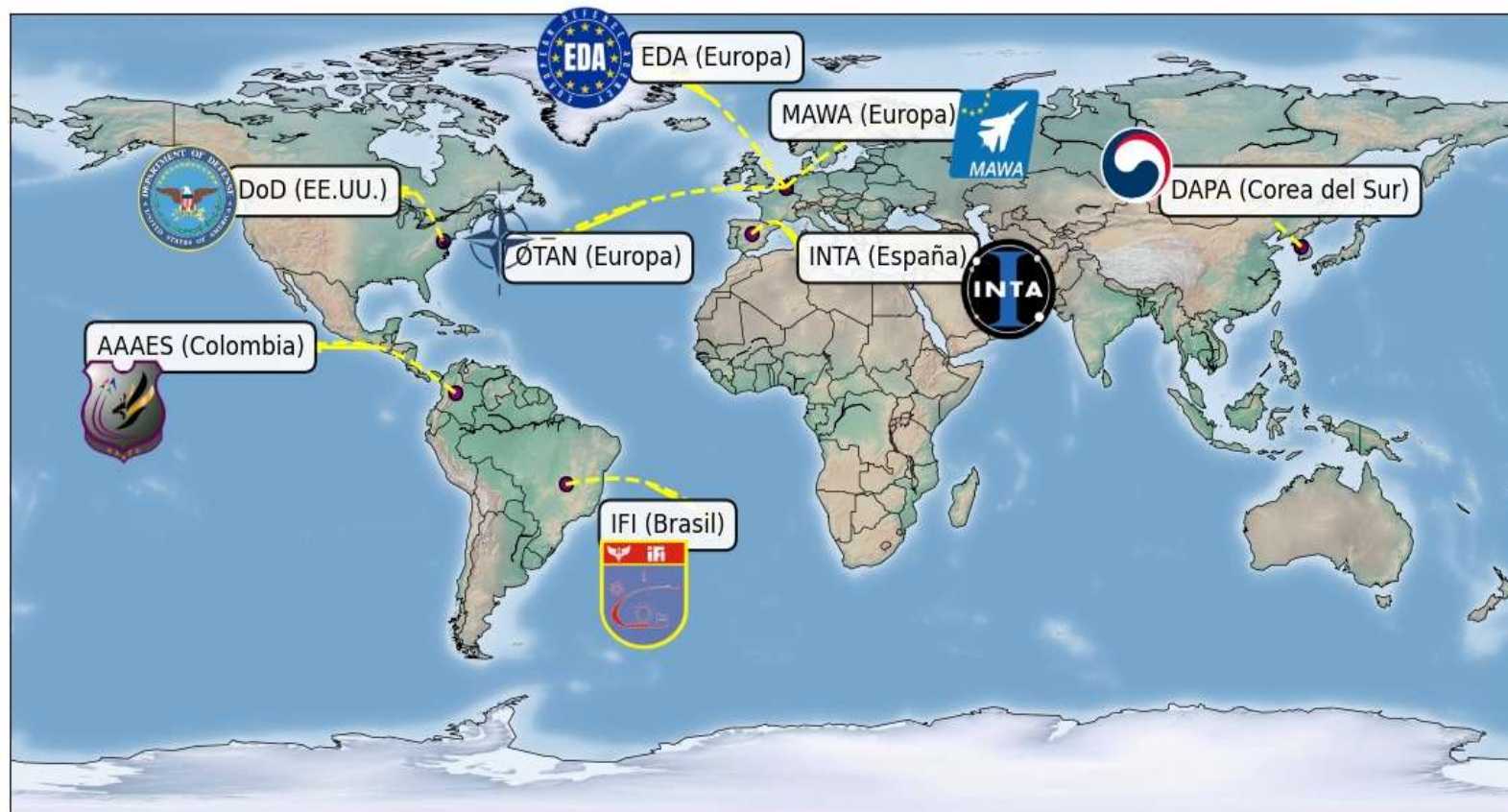
We work for State Aviation Security

Road Map



We work for State Aviation Security

2. Road Map



Signed



In Process



Military
Organizations



We work for State Aviation Security

Initial Airworthiness



We work for State Aviation Security

Colombian State Aviation Aeronautical Regulation - RACAE - 21



Product Certification

Certifies aeronautical products and their components.

Aeronautical Product Certification and Recognition of Design and Production Organizations

Compliance Supervision

Oversees adherence to aviation regulations.

Test Validation

Validates aeronautical tests and procedures.

Organization Recognition

Recognizes design and production organizations.

Modification Approval

Approves significant changes to aircraft.



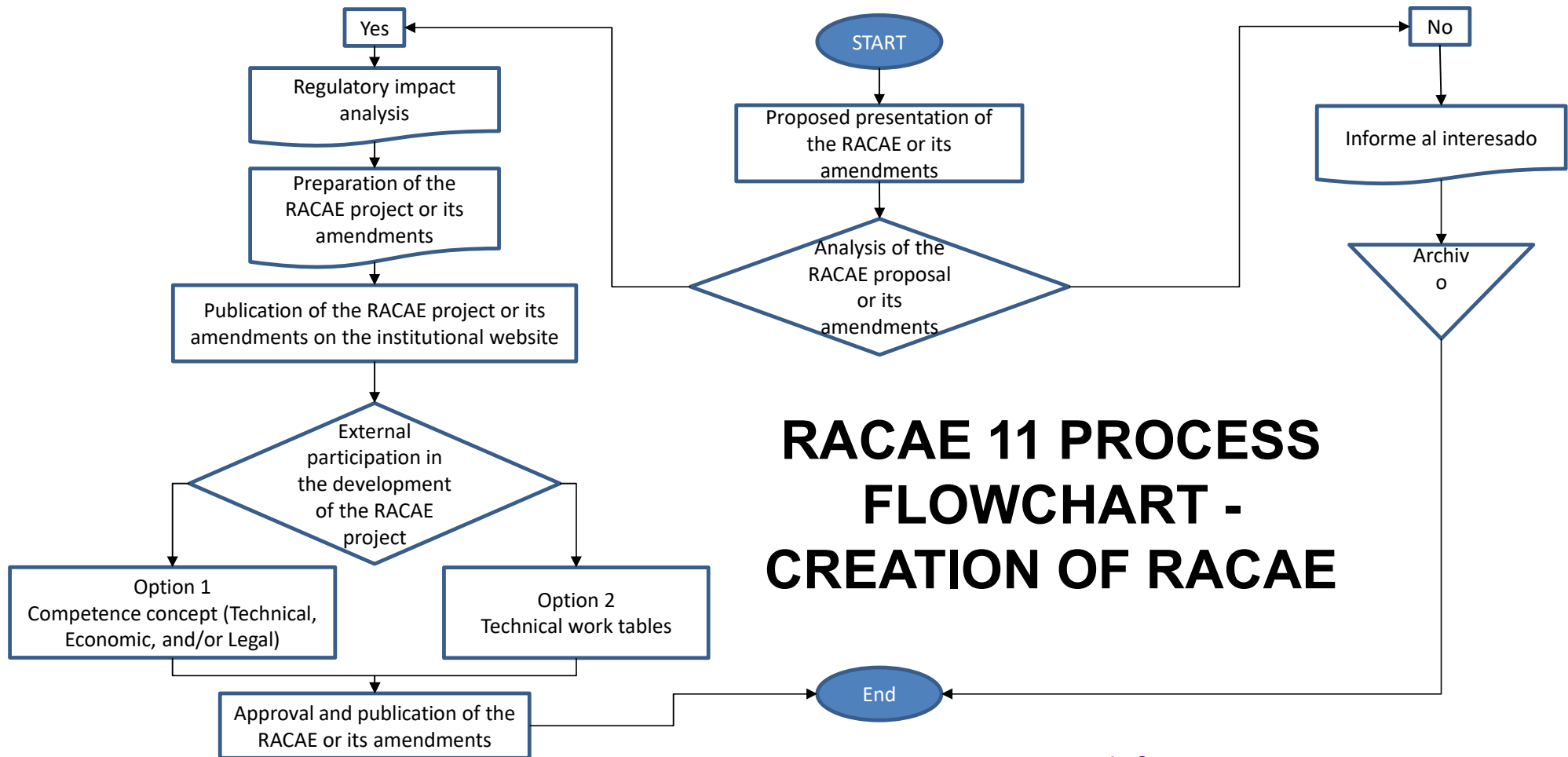
We work for State Aviation Security

Lessons Learned



We work for State Aviation Security

Colombian Military Airworthiness Regulation



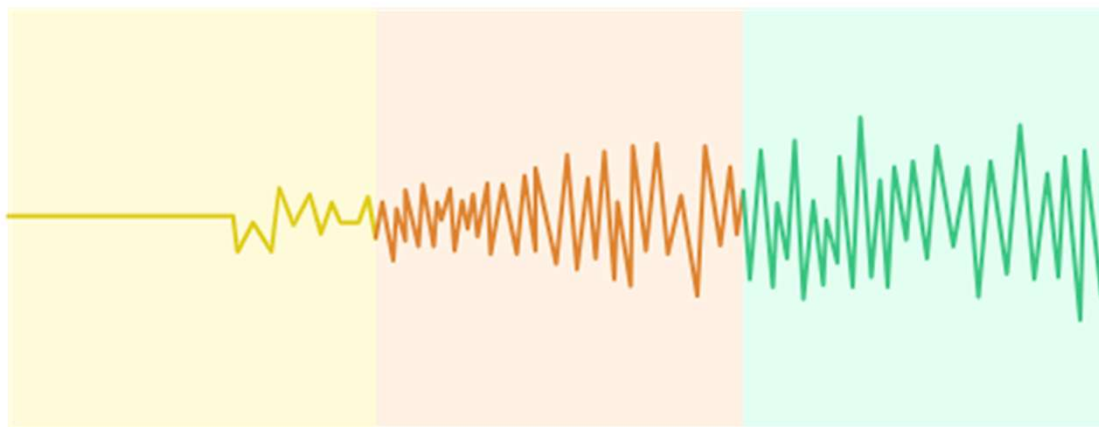
We work for State Aviation Security

RACAE 94



Flight and Operating Rules for Unmanned Aircraft Systems and Remotely Piloted Aircraft Systems

Need ←————→ Publication



Origin of the need

Addresses criminal use and regulatory gaps

Development of RACAE 94

Collaboration of all State Aviation Entities for regulation creation

Official publication

Comprehensive regulation of UAS operations

We work for State Aviation Security



Conclusions



We work for State Aviation Security

Conclusions



- **Regulatory Framework as an Enabler:** Regulations provide a solid legal framework, offering tools for State aviation services to effectively respond to internal conflict scenarios.
- **Military Airworthiness Authority as a Strategic Capability:** Beyond its regulatory function, a Military Airworthiness Authority is recognized as a strategic capability, essential to national defense and operational readiness.
- **Identified as a Metacapability:** The Authority acts as a metacapability—it not only strengthens its own domain but also enables the development of other critical capacities within the defense and aerospace ecosystem.
- **Guiding Industrial Development under the Principle of Safety:** While acting as a metacapability that can guide the growth of a national aeronautical industry, its core principle remains MAWA's vision: "Safety always."

We work for State Aviation Security



MILITARY AIRWORTHINESS CONFERENCE



8 & 9 October
The Hague, The Netherlands

Hosted by



#MAC25

Day 2 - 9th October 2025

Session 3
Interoperability - EMARs forever

08:30 - 09:00	Welcome and Coffee
<u>09:00</u> - <u>09:25</u>	<u>Aircraft Cross Servicing</u> & <u>Aircraft Cross Maintenance from a EMAR-</u> <u>Perspective</u> – Col Christian Lörch LufABw, GAF, DE MAA
0925 – <u>09:50</u>	<u>Leveraging recognition for maintenance organisation approval</u> – Colonel ItAF Giorgio BORGHI, IT DAAA
09:50 - 10:15	Feedback on the issuance of an EMAR 145 approval to an organisation located outside the EU– Michael Fella, Director of Depot Operations & EMAR/FR 145 Workshop Manager for GA-ASI and colonel Thierry Schuster, deputy airworthiness director DSAE
10:15 - 10:45	Panel Discussion
10:45 - 11:15	Coffee break

Session 4

Challenges for the future

11:15 - 11:40	Civilian Airworthiness Outlook – Alain LEROY, chief engineer EASA
11:40 - 12:05	UAS way ahead – Ross McKenzie, NATO and Joao Caetano, EDA,
12:05 - 12:30	Certification challenges in a changing world – Professor Arjan de Jong, NLR
12:30 - 12:55	Additive Manufacturing – Kees Temminck, NL Airforce and Maarten van <u>Ramshorst, Aeronamic</u>
12:55 - 13:20	Panel Discussion

Conference Summary & Outcomes

13:20 - 13:30	Closing Remarks
13:30 - 14:30	Lunch



MILITARY AIRWORTHINESS CONFERENCE



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AIRCRAFT CROSS-SERVICING & AIRCRAFT CROSS-MAINTENANCE AN EMAR-PERSPECTIVE

LufABw Division 1

Colonel (GS) Christian Lörch

The Hague, 13/10/2025



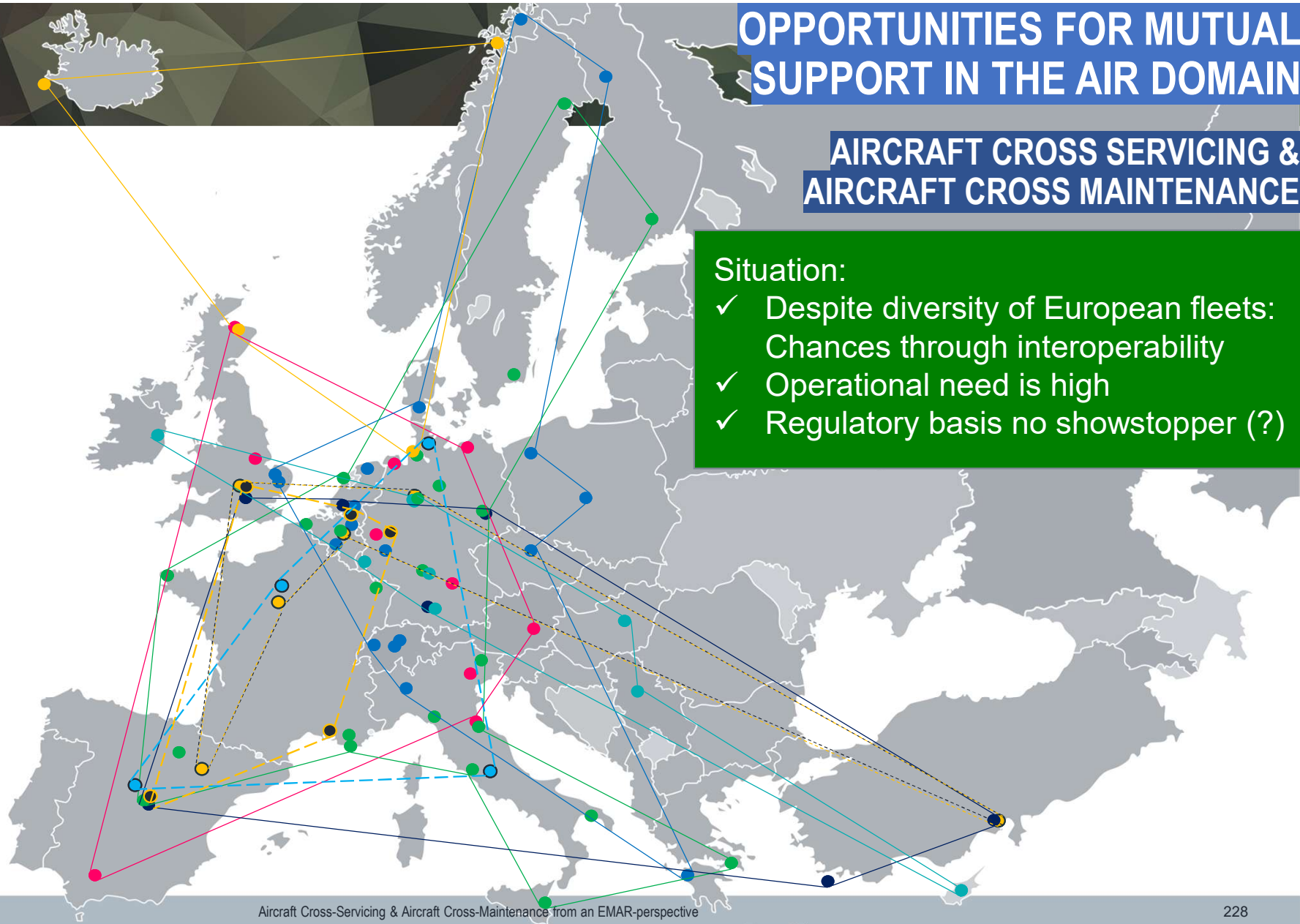
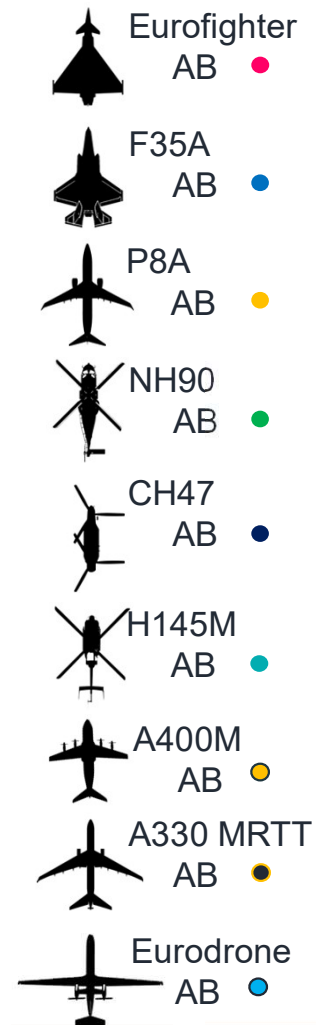
BUNDESWEHR

OPPORTUNITIES FOR MUTUAL SUPPORT IN THE AIR DOMAIN

AIRCRAFT CROSS SERVICING & AIRCRAFT CROSS MAINTENANCE

Situation:

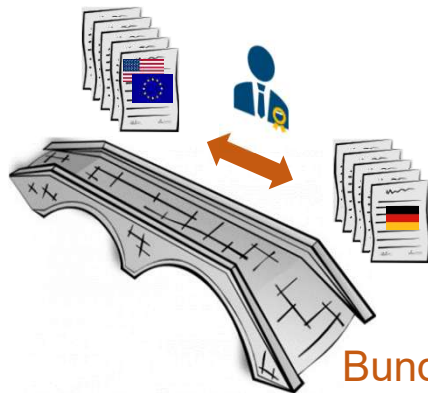
- ✓ Despite diversity of European fleets:
Chances through interoperability
- ✓ Operational need is high
- ✓ Regulatory basis no showstopper (?)



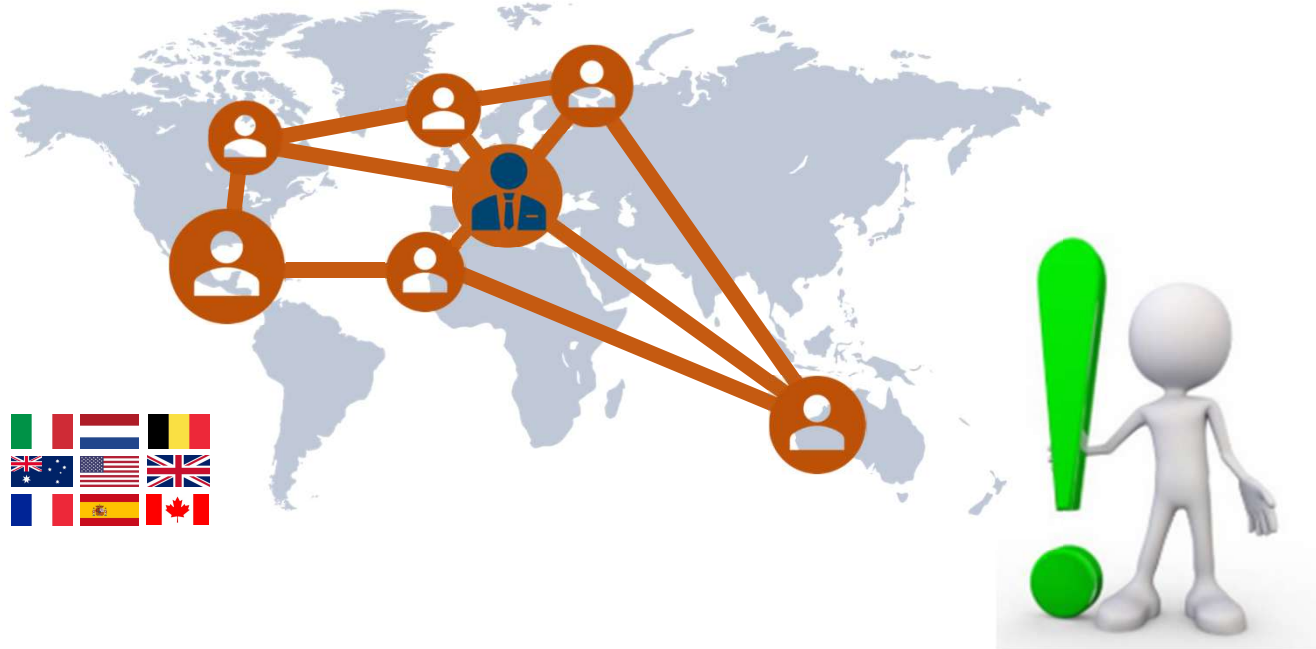
EUROPEAN MILITARY AIRWORTHINESS REQUIREMENTS: BRIDGING REMAINING GAPS BETWEEN NATIONS

With EMAR and recognition, a partner's maintenance can be made available to us!

Partner



Bundeswehr



Advantages

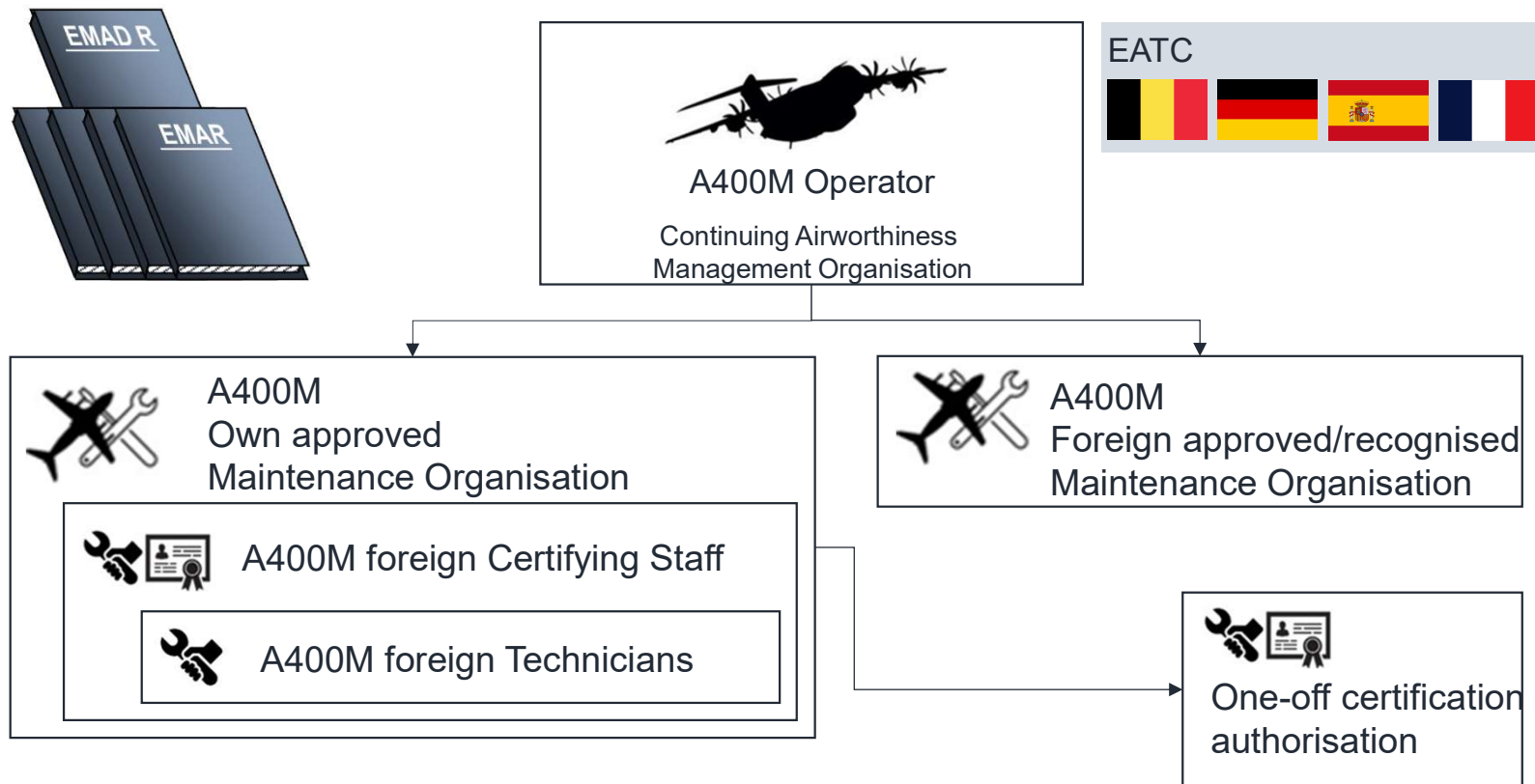
- Increased operational readiness
- Interoperability for common A/C types with acceptable effort

Luftfahrtamt der Bundeswehr



Aircraft Cross-Servicing & Aircraft Cross-Maintenance from an EMAR-perspective

EMARS ARE PAVING THE WAY FOR INTEROPERABILITY – CROSS MAINTENANCE IS A „NORMAL“



e.g.

- ESP Technicians in DEU
- Exchange of Certifying Staff
- Tasking of ESP MO

AIRCRAFT CROSS SERVICING - WHERE WE CAME FROM AND WHERE WE HAVE TO GET AGAIN

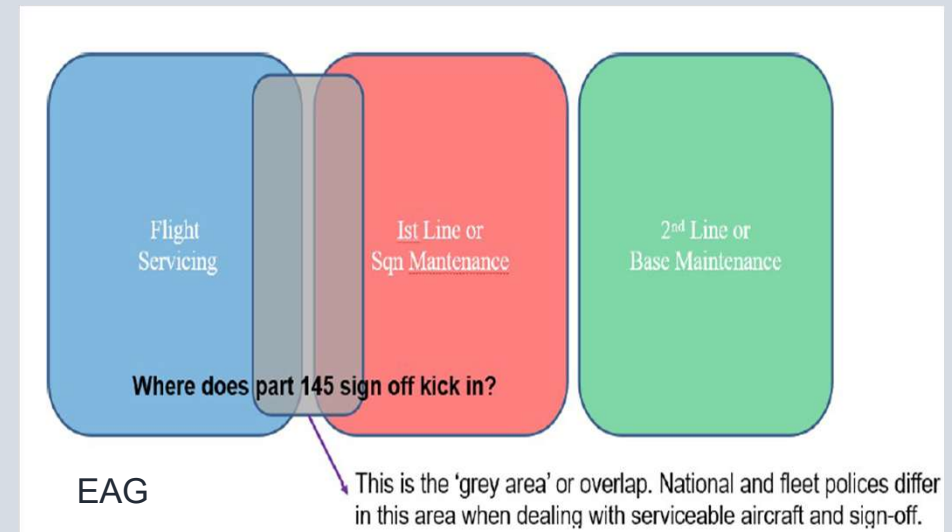
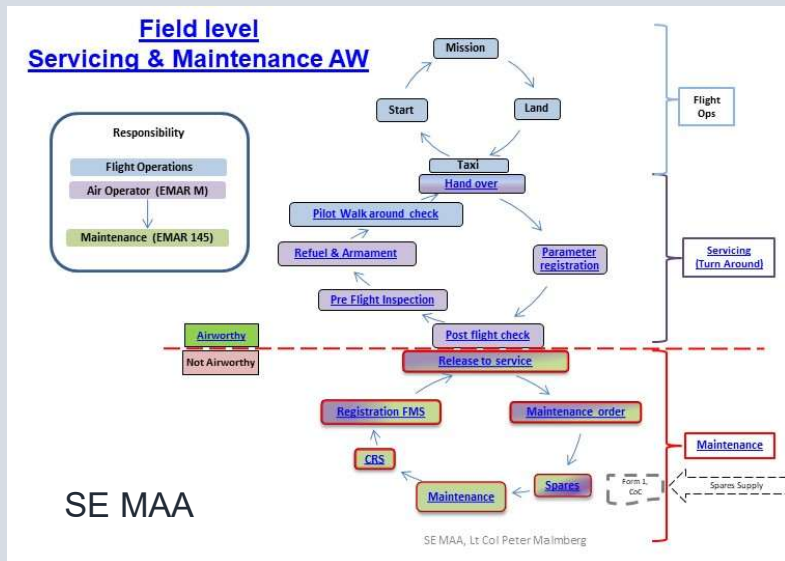


STANAG 3430 Ed. 9	STANAG 3430 Ed. 10	STANAG 3430 Ed. 11 now	What is needed...
Stage A 	Stage A <i>„ACS as low cost programme“</i>	Stage A <i>„Not yet defined – under evaluation“</i>	
Stage E 	Stage E <i>„Sleeping resource“</i>	Stage E Mission Cross-Servicing GC	Mission Cross-Servicing GC <i>Fix a definition</i>
Stage C 	Stage C AC	Stage C Basic Cross-Servicing AC, GC as per national deviation NATO Standardization Agreement (STANAG 3430), Aircraft Cross Servicing	Basic Cross-Servicing GC

What is Servicing ?
 Where does Maintenance begin?
 What responsibility can be given to the GC?

„SERVICING“ IS A PROBLEMATIC TERM FOR EMAR-NATIONS – BUT „NATO ACS“ SHOULDN‘T BE

What is Servicing ?



Definition attempts of NATO Air Comand A4 and European Air Group by listing „Servicing“ tasks didn't succeed:
Causes:

- „Grey Zone“ between Maintenance and „Non-Maintenance“,
- Within EMAR „Servicing“ is used for a subcategory of Maintenance,
- An absolute definition leaves no room for national perspectives.

No common position
achievable.

A PROPOSAL FOR A SOLUTION: DIFFERENTIATE THE OTHER WAY ROUND



High effort for Maintenance according to EMAR:

- Approved Maintenance Organisation,
- Certifying Staff,
- Recognition, ...

Goal:

- generate security of action,
- reduce procedural efforts,
- increase operational flexibility.



What is Servicing ?

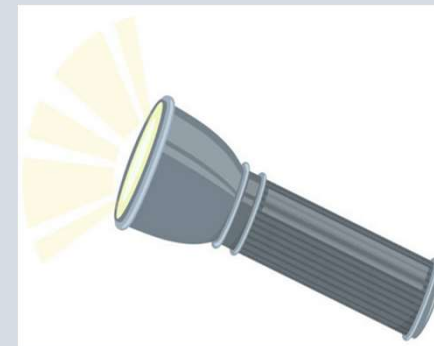
What is Maintenance ?



LufABw jointly developed an analytical approach to categorize a technical activity on the aircraft as a maintenance activity including an associated certification (CRS) obligation.

This “Decision Rationale Maintenance“

- lights up the grey zone between Maintenance and „Non-Maintenance“,
- avoids the term „Servicing“,
- leaves in detail room for national perspectives.



NEW APPROACH – THIS IS NO MAINTENANCE

1 Ground Handling

- marshalling (including installation/removal of brake blocks and ladders);
- installing/removing ground safety elements (such as safety pins, etc.);
- establishing power supply on the ground;
- refueling (cold and hot)/defueling;
- towing/pushing;
- removing ice/snow;
- applying anti-icer;
- installing/removing covers;
- providing support to starting the engines.
- If applicable:
filling the aircraft with freshwater, draining wastewater, loading cargo/luggage.

2 Support service specific to the military

- mission role/configuration change *;
- loading of ammunition and/or decoys *;
- other:
 - Classification of fault indications (checklist);
 - data outflow.

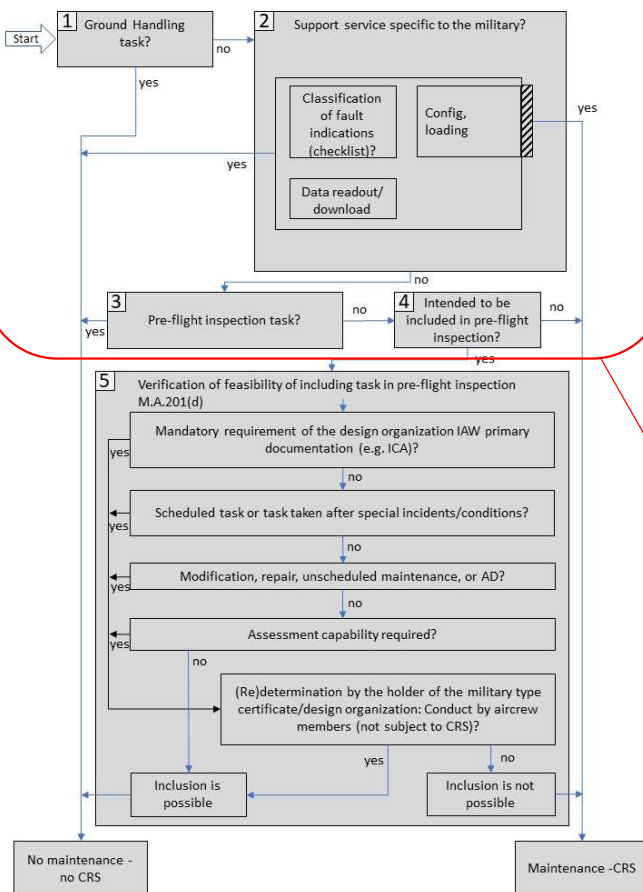
* Where no intervention in the aircraft systems and no additional test equipment is required

3 Pre-flight Inspection

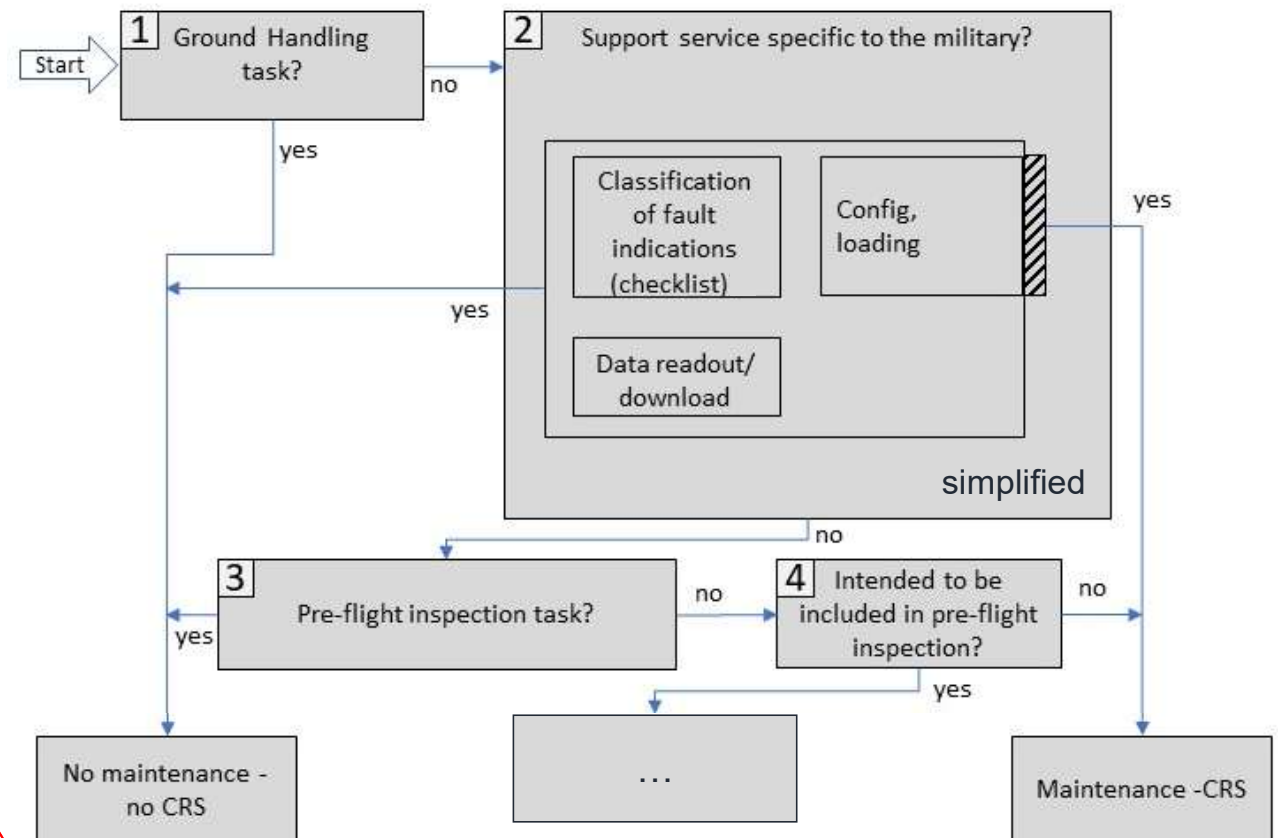
- tasks according to AMC M.A.301(a)
 - a walk-around type inspection of the aircraft, emergency equipment and stores/weapons for condition;
 - inspection of the aircraft technical log
 - correct specification and recording of consumable fluids, gases etc.
 - doors securely fastened;
 - control surface and landing gear locks, covers/blanks removed;
 - free from ice, snow, sand, dust etc.;
 - removal of safety/arming pins;
 - oil and hydraulic fluid uplift and tyre inflation (if considered as part of the pre-flight inspection)
- Pre-flight Inspection tasks according to Aircraft Flight Manual;
- Turnaround Inspection according to type-related maintenance documentation.

MAINTENANCE DECISION RATIONALE – PART 1: MOST ACS TASKS AREN'T MAINTENANCE

Maintenance Decision Rationale

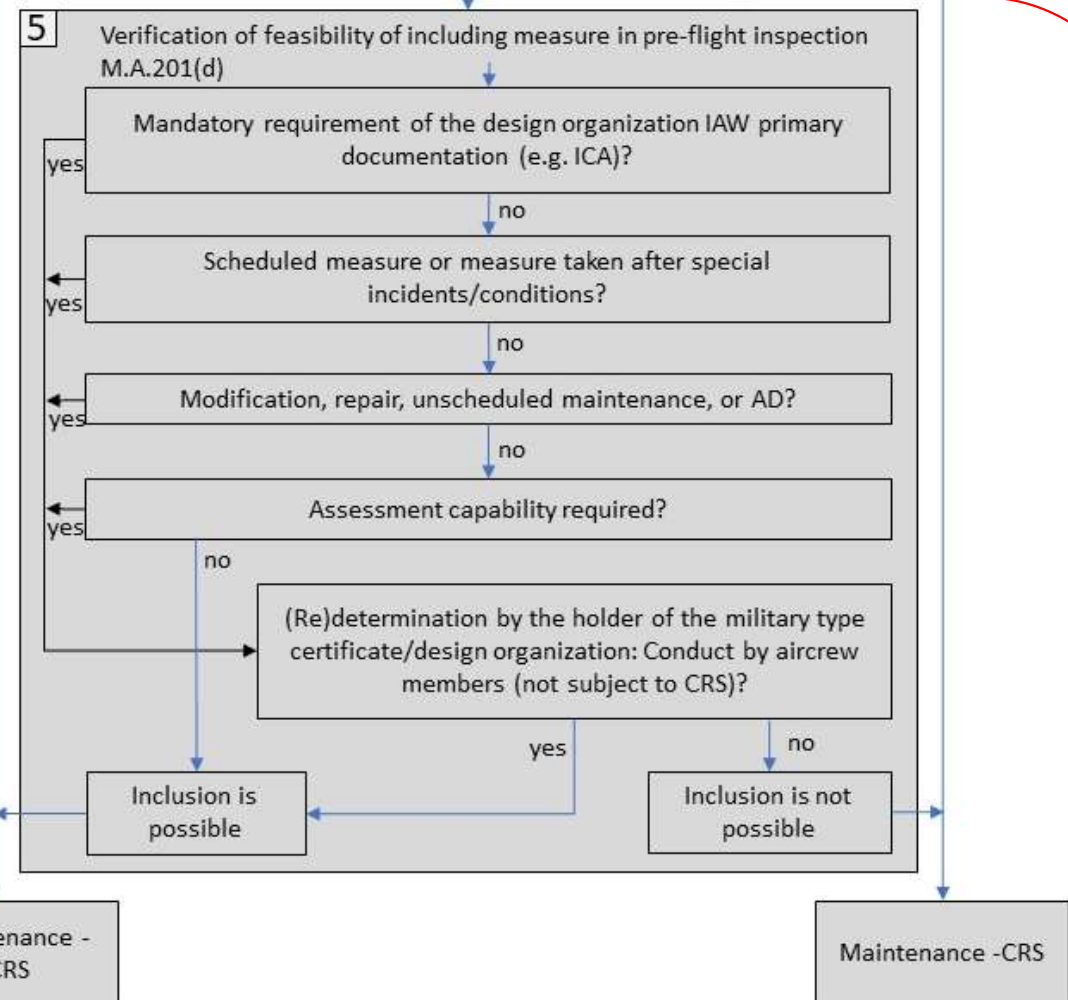
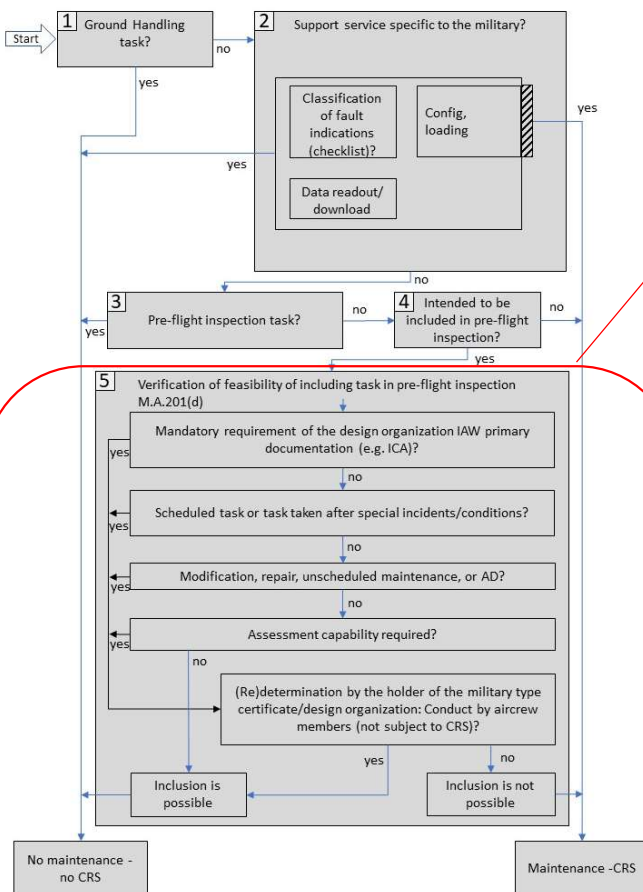


Maintenance Decision Rationale



MAINTENANCE DECISION RATIONALE – PART 2: EXCLUDING MAINTENANCE TASKS FROM PRE-FLIGHT INSPECTION

Maintenance Decision Rationale



DON'T WAIT FOR OTHERS TO CHANGE – ENSURE THAT YOU ARE ADAPTABLE

LufABw approved the application of the Decision Rationale Maintenance already by publishing an Authority Information.

What's the result?

DEU (operating organisation) has the possibility to accept ACS support from all (trained) partners, whether they issue a national EMAR CRS for these tasks or not.

This means a regulatory basis for increased interoperability and operational flexibility!

Proposal to MAWA Forum:

**Implement the Rationale in EMAR M,
so any EMAR Nation could use it, if they decide to do so.**

	
Federal Office of the Bundeswehr for Military Aviation	
Section 1	
Information for Operation, Maintenance and Continuing Airworthiness of Bundeswehr Aircraft	
No. 02/2025	
Editor (FspNBw)	Date of publication
LTC Vitzthum (90-3451-1784)	15.05.2025
Subject/Topic/Question	
Publication of a Maintenance Decision Rationale	
References	
1. → Final Report: „Servicing vs. Maintenance“, LufABw-1-01.04.2025	
2. → Regulation „Aufrechterhaltung der Lufttüchtigkeit DEMAR M“ A1-275/3-8903	
3. → Regulation „AMC und GM zur DEMAR M“ A1-275/3-8904	
The operating organization is provided with a type-independent decision rationale in the event that the assessment of the operation and maintenance regulations (including measures for continuing airworthiness) applicable in accordance with the type certification does not allow a clear distinction between maintenance measures and other activities on the aircraft. It can be used as the basis for the preparation of operational procedures and is used by EOMAB members within the scope of approval procedures. The competent CAMO will then verify the extent to which a change to the maintenance program will need to be initiated.	
The application of the rationale must be described in a manual procedure (CAME). Decisions made must be documented and, if necessary, appropriately incorporated into the CAMO documentation for consistency.	

Content:
Decision Rationale Maintenance and
relevant explanations



SUMMARY: INTEROPERABILITY OPPORTUNITIES ENHANCED BY EMAR

DE (or other Nation)



Partners



Aircraft Cross-Maintenance



- Recognition
(General and project-related)
- Limited to specific project, e.g. A400M, P8-A, Typhoon, F35

Bilateral Agreement ACM

- Push Recognition
- Benefit from operational readiness

NATO Aircraft Cross-Servicing

Almost no Recognition!



- Use NATO Standard AASSEP-13:
- Define and offer required ACS training,
 - Issue ACS Certificate
- EMAR Nations:
Establish ACS Certificate as an appropriate Qualification for Pre-flight (Turnaround) Inspection, Ground Handling and support services specific to the military (in the CAME).

Bilateral Agreement ACS

- Determine required support,
- Determine tasking and documentation procedures,
- Assign responsibility for Basic Cross-Servicing to ground crew,
- If maintenance is included: Recognition (ACM)
- What else is needed.

- Send staff for:
- ACS training,
 - (Re-)Certification,
 - Combined exercises, ...





THANKS FOR YOUR ATTENTION!



BUNDESWEHR



MILITARY AIRWORTHINESS CONFERENCE



8 & 9 October
The Hague, The Netherlands

Hosted by



#MAC25



ITALIAN MINISTRY OF DEFENCE

NATIONAL ARMAMENTS DIRECTORATE

DIRECTORATE OF AERONAUTICAL ARMAMENTS AND AIRWORTHINESS (DAAA)



**LEVERAGING RECOGNITION FOR
MAINTENANCE ORGANISATION APPROVAL**

Col ItAF Giorgio BORGHİ
The Hague, October 2025

DIREZIONE ARMAMENTI AERONAUTICI E PER L'AERONAVIGABILITA'

OBJECTIVE



DESCRIBE RECOGNITION APPLICATION TO MILITARY AIRWORTHINESS

ILLUSTRATE RECOGNITION CRITERIA AND DOCUMENTS

SHARE TANGIBLE RESULTS



RECOGNITION IS AN EFFECTIVE TOOL

SUMMARY



WHAT IS RECOGNITION



THE EUROPEAN VISION: THE MAWA PROJECT



RECOGNITION CRITERIA



MX ORGANISATION APPROVAL BY RECOGNITION

SUMMARY



WHAT IS RECOGNITION



THE EUROPEAN VISION: THE MAWA PROJECT



RECOGNITION CRITERIA



MX ORGANISATION APPROVAL BY RECOGNITION

WHAT IS RECOGNITION



A WAY TO ESTABLISH SIMILARITY BETWEEN REGULATORY SYSTEMS

ALLOWS RE-USE OF CERTIFICATIONS AND APPROVALS



USED IN SEVERAL DOMAINS

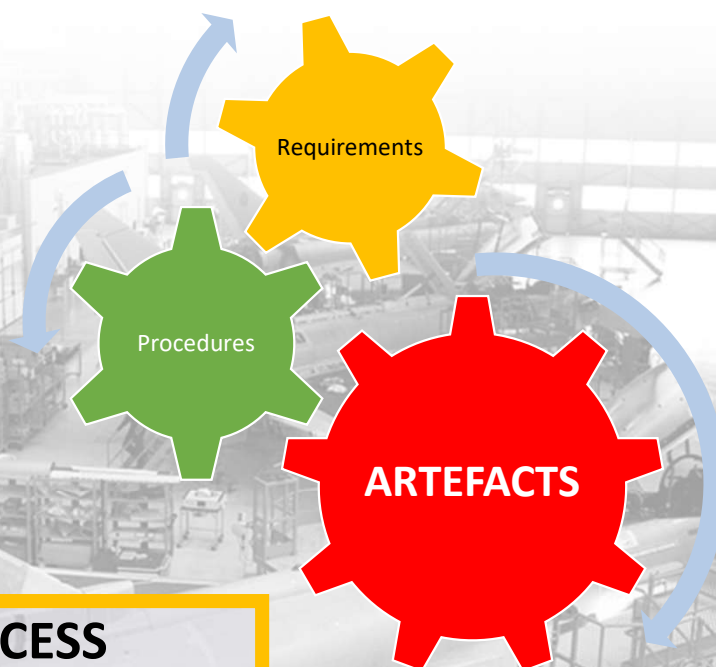
CIVIL AVIATION, PHARMACEUTICS, TRADE & EXPORT,
METROLOGY, TELECOMMUNICATIONS...



NO STANDARD SUPRANATIONAL PROCESS

MILITARY: GUIDELINES FROM EUROPE (EMAD R) AND NATO (NATO
RECOGNITION PROCESS), WITH DIFFERENT CONDITIONS AND SCOPE.

First attempt: IT/UK/NAVAIR Joint Reciprocity Assessment (2009-2011)



WHAT IS RECOGNITION

ATTRIBUTES AND DEVELOPMENT OF A RECOGNITION

PROCESS LEVEL

- A DILIGENT, TRACEABLE AND INFORMED PROCESS OF ANALYSIS TO VERIFY THAT THE SYSTEM UNDER RECOGNITION PROVIDES AN ALTERNATE BUT ADEQUATE LEVEL OF SAFETY
- BENEFIT FROM INCREASED COOPERATION, IMPROVED INTEROPERABILITY, ACCEPTANCE OF ONE ANOTHER'S ARTEFACTS

INTERNATIONAL LEVEL

- ESTABLISH RELATIONSHIP AND ADDRESS THE NEED TO EXCHANGE ARTEFACTS
- FIND AGREEMENT ON PROCESS AND EXPECTATIONS
- PERFORM AND SUSTAIN RECOGNITION CERTIFICATION (POTENTIAL CONDITION)
- PERFORM AND SUSTAIN RECOGNITION IMPLEMENTATION (OPERATIONAL CONDITION)

NATIONAL LEVEL

- INSTRUCTIONS TO THE REGULATED COMMUNITY, TO PROVIDE FORMAL AND UNILATERAL AUTHORIZATION TO USE SELECTED FOREIGN ARTEFACTS IN PLACE OF NATIONAL ONES

SUMMARY



WHAT IS RECOGNITION



THE EUROPEAN VISION: THE MAWA PROJECT



RECOGNITION CRITERIA



MX ORGANISATION APPROVAL BY RECOGNITION

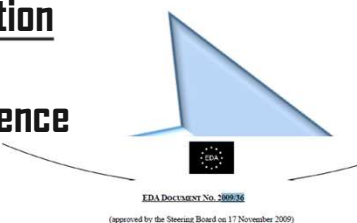
THE EUROPEAN VISION: THE MAWA PROJECT

**Military Airworthiness
Authorities (MAWA)
Forum & European
Military Airworthiness
Roadmap**



**Political Declaration
of the European
Ministries of Defence**

2009



**Defence Ministers' Political Declaration
Regarding the timely Development and Implementation of the European
Military Airworthiness Requirements**

We, the European Defence Agency Steering Board in Defence Ministers' formation:

- 1) Acknowledging that the EDA participating Member States recognise that the lack of a common approach to military airworthiness is significantly increasing the cost of air systems and causing significant delays in European aircraft programmes;
- 2) Expressing our understanding that timely development and implementation of the harmonised European Military Airworthiness Requirements (EMARs) should mitigate the abovementioned deficiencies as well as improve the European Defence Technology and Industrial Base (EDTIB) competitiveness;
- 3) Emphasising the aim of EMARs to define harmonised common requirements procedures and processes, consistent with International Civil Aviation Organisation Conventions (ICAO) and European Commission (EC) principles. The documents should be based on European Aviation Safety Agency (EASA) (EC) regulation N°216/2008 and other subsidiary documents, but will take into account specific aspects of military operations. Ongoing work related to the Single European Sky will be taken into consideration;
- 4) And recognising that the common EMARs will provide the European military aeronautics authorities the opportunity for mutual recognition. To ensure transparency national deviations should be declared. It should also be noted that the national aeronautics authorities involved in a particular programme can define more stringent requirements to meet particular national needs.

Declare our political support for national airworthiness authorities to develop and implement the EMARs. These requirements shall be developed in line with the Endorsed Roadmap¹ and with the Basic Framework document established by the MAWA Forum.

¹ EDA Doc. 04a, 2008/19 of 10 November 2008 on a "Roadmap as an EU-wide Forum for Military Airworthiness (MAWA)"
EDA DOC No. 2009/36

**MAWA Forum in charge for
development of European
Military Airworthiness
Requirements (EMAR)**

EMAR foster RECOGNITION



2004

**International
Coordination**



**Enabling element for the
Integration of Defence along
with its industrial counterpart**

THE EUROPEAN VISION: THE MAWA PROJECT

EUROPEAN MILITARY AIRWORTHINESS REQUIREMENTS (EMAR)
allowed completion of first six Roadmap objectives



SUMMARY



WHAT IS RECOGNITION



THE EUROPEAN VISION: THE MAWA PROJECT



RECOGNITION CRITERIA



MX ORGANISATION APPROVAL BY RECOGNITION

RECOGNITION CRITERIA

DAAA APPROACH

SCOPE

- IMPROVE COOPERATION AMONG AUTHORITIES
- REALIZATION OF BENEFITS (AVOID DUPLICATION, MONEY / TIME / RESOURCES SAVINGS, INTEROPERABILITY, COMMON PROGRAMS...)

STEPS

- ALLOWS PHASED APPROACH FOR OPTIMAL EXECUTION
- PROVIDES DEDICATED MANAGEMENT FOR THE ASSESSMENT AND FOR THE IMPLEMENTATION

TIERS

- ALLOWS FLEXIBILITY FOR ASYMMETRIC RECOGNITION
- AT STEP A, DETERMINES SUITABILITY FOR ARTEFACTS' EXCHANGE (RE-USE)

DETERMINE ONE OR TWO-WAY

IDENTIFY AIWORTINESS DOMAINS
(INITIAL, CONTINUED, CONTINUING)

STEP A - GENERAL RECOGNITION
DEDICATED TO CERTIFICATION OF RECOGNITION AND
DECLARATION OF LEVEL OF COOPERATION (TIER)

STEP B - LEVERAGE RECOGNITION
DEDICATED TO DEVELOPMENT OF BENEFITS,
ESTABLISH COMMITMENT AND GOVERNANCE

TIER 1: COOPERATION LEVEL
TRUST, COMMON UNDERSTANDING
(SIMILAR TO NATO RECOGNITION)

TIER 2: SUITABILITY LEVEL
EQUIVALENCE OF SYSTEMS, ENABLES CONSUMPTION
OF ARTEFACTS



RECOGNITION CRITERIA

THE RECOGNITION AGREEMENT (RA) = DOCUMENT AIMED TO AGREE ON ENGAGING AND SUSTAINING RECOGNITION




Recognition Agreement

between the
National Military Airworthiness Authorities
of

Italy



Direzione degli Armamenti Aeronautici e
per l'Aeronavigabilità (DAAA)
Directorate of Aeronautical Armaments and Airworthiness

and

Austria



Luftzeugabteilung (LzA)
Air Materiel Division

nt

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1. HISTORY

2. OBJECTIVES

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4. SCOPE

5. GENERAL OBLIGATIONS

6. PRESERVATION OF REGULATORY AUTHORITY

7. COMMUNICATIONS

8. COSTS

9. EFFECTIVITY AND TERMINATION

10. RES BLOCK

11. ANNEX

Version Number: 1.0

Version Date: July 2021

Page: 2

MAIN BODY: DEFINITIONS, GENERAL OBLIGATIONS, COSTS, TERMINATION

TECHNICAL ANNEX

Recognition Agreement between ITA DAAA and AUT LzA

that potential for benefits is achievable within the domain of (no Aviation functions involved). Table 1 describes the ambition level effort, and the related programmes / platforms that can gain

Programme/Platform	Recognising Party	Recognised Party
Italy as competent Military at has appropriate regulatory arrangements for Initial / worthiness. Recognition, the recognizing Party to receive artefacts from the initial consumption. Developing joint programs and Austrian acquisition program.	LzA	DAAA

Table 1

It is agreed that: One-Way Recognition is the most appropriate option between DAAA and LzA.

Resourcing

During a complete Military Airworthiness Recognition Question set up the related clarification session, the Parties will provide Suitably Resourced Personnel (SQEP). The level of effort shall be commensurate with the timeline at point 4.

Base Resourcing

Provide SQEP for the sustenance of the Recognition, through the contract (see point 6). The level of effort shall be commensurate to the planned timeline at point 4.

Version Number: 1.0

Version Date: July 2021

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TECHNICAL ANNEX: SPECIFIC SCOPE, RESOURCE COMMITMENT, PLAN, CONTACTS

RECOGNITION CRITERIA

THE RECOGNITION CERTIFICATE (RC) = DOCUMENT AIMED TO UNILATERALLY CERTIFY SUITABILITY OF RECOGNIZED SYSTEM

MILITARY AUTHORITY IDENTIFICATION WITH TIER DETERMINATION

RECOGNITION CERTIFICATION

The Recognition Certificate (RC) is issued pursuant to national requirements, based on the criteria established in EMAD R (Edition 3.0). The recognition has been executed in accordance with the Recognition Agreement between the National Military Airworthiness Authorities (NMAA), signed in January 2019, and its results are captured in the DAAA (June 2023). This RC signifies that MLA military airworthiness system is for Tier 2 General Recognition by DAAA.

RECOGNITION SCOPE

to gain the knowledge required to establish similarities in each other's military aircraft/program agnostic perspective, in the sectors of:

Continued Airworthiness of military aircraft (based on EMAR 21)
Airworthiness of military aircraft (based on EMAR M / 145 / 147 / 66)
Registration of military aircraft

General Recognition, DAAA may consume data through artefacts (certificates and releases) by MLA, which provision shall be regulated via a dedicated Recognition Arrangement (RIA).

RECOGNITION CONDITIONS

Since that Recognition is a national responsibility is maintained, hence sovereign responsibility is not abdicated by issuance of this RC. The RC is effective for a period of 5 years, until the end of June 2028. Its validity is: limited to the recognition scope mentioned above; renewal activity is underway beyond said date, until renewal or withdrawal; notification that MLA: intention to inform DAAA, in all reasonable haste, of any significant changes to the airworthiness system, to allow proper review of the recognition status; compliance with its own regulatory framework; capability to fulfil its responsibilities and enforcement authority, with adequate

DAAA	Name: Lt. Gen. Giuseppe LUPOLI	Date:
	Title: DIRECTOR of DAAA	
	Signature: 	June 7th 2023

TIER DECLARATION: OBTAINED FROM THE ASSESSMENT IN THE RECOGNITION REPORT

DECLARATION OF SCOPE: AIRWORTHINESS DOMAINS ASSESSED

RECOGNITION CONDITIONS: EXPIRATION, CONTINUED VALIDITY

RECOGNITION CRITERIA

THE RECOGNITION IMPLEMENTING ARRANGEMENT (RIA) = DOCUMENT AIMED TO GOVERN EXCHANGE OF ARTEFACTS




**Recognition
Implementing Arrangement**

between the
National Military Airworthiness Authorities
of

Italy


Direzione degli Armamenti Aeronautici e
per l'Aeronavigabilità (DAAA)
Directorate of Aeronautical Armaments and Airworthiness

and

Norway


Norwegian Military Airworthiness Authority
(MAA-NOR)
c/o Norwegian Defence Materiel Agency (NDMA)

RIA Version: 0.0

UNCLASSIFIED
REL TO: Gov use, NATO, EDA, Contractors - Not for public dissemination

1

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MAIN BODY: DEFINITIONS, GENERAL OBLIGATIONS, COSTS, TERMINATION

TECHNICAL ANNEX 1

Implementing Arrangement between ITA DAAA and NOR NDMA

Military Aeronautical Products - Support to NOR F-35 Program

Arrangements of the F-35 Program for a Global Support Solution, developed for the assignments of Outside the Continental United States and global Maintenance, Repair, Overhaul, and Upgrade. The Italian industrial site of Cameri has been activated¹ as the F-35 Vehicle MROBU and Norwegian aircraft are being inducted to NDMA has elected to leverage DAAA artefacts, seeking certification for 35 aircraft performed at Cameri, as a Military Aircraft Maintenance Organization (MAO) for DAAA Approval.

OBJECTIVES

The Norwegian F-35 fleet is managed under the auspices of NDMA, as the Recognition process allowed NDMA to determine that efficiency be gained through the support of DAAA, as the Italian NMAA or the mentioned Military MO residing in Italy. According to SECTION 2, the mentioned activities are supported, by DAAA, toward NDMA's maintenance of Military Aircraft Maintenance Organization.

Highlights the specific areas pertaining to the data to be exchanged:

Airworthiness Domains

- ☐ 21A – Occurrences and Airworthiness Directives
- ☐ 21B&D – MTC & MRTC
- ☐ 21E – MSTC
- ☐ 21F – Production without MPOA
- ☐ 21G – MPOA
- ☐ 21H – MCoA & MRCoA
- ☐ 21J – MDOA
- ☐ 21K – Parts & Appliances
- ☐ 21M – Repairs
- ☐ 21O – MTSO Authorisations
- ☐ 21P – MPTF

TECHNICAL ANNEX: OBJECTIVE, AIRWORTHINESS DOMAINS INVOLVED, TASKS AND DELIVERABLES, DETERMINATION OF ACCEPTANCE OR VALIDATION COSTS INCURRED OR FULL RECIPROCITY

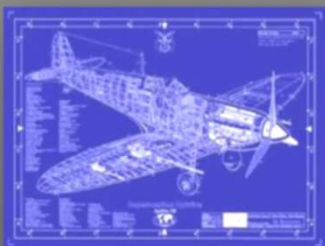
¹ JESB DM #06 on 30 March 2017; Program Instruction 1505-02.01;

² F-35 JPO Memorandum on Declaration of Full Depot Capability, 10 June 2022.

RIA Version: 0.0	UNCLASSIFIED REL TO: Gov use, NATO, EDA, Contractors - Not for public dissemination	10
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RECOGNITION CRITERIA

ACHIEVEMENTS THROUGH RECOGNITION IMPLEMENTING ARRANGEMENTS (RIA)



INITIAL & CONTINUED AIRWORTHINESS

- SPAIN - Initial Airworthiness for the NH90 Spanish MSPT Engine Variant
- NETHERLANDS - F-35A As-Built Airworthiness Statement of Compliance
- SLOVENIA - Initial and Continued Airworthiness Support – SVN C-27J Spartan Program
- AUSTRIA - Initial and Continued Airworthiness Support - AW-169 LUH Program
- POLAND - Continued Airworthiness Support – M-346 Program
- SINGAPORE - Continued Airworthiness Support – M-346 Program



CONTINUING AIRWORTHINESS

- GERMANY - Maintenance of Military Aeronautical Products & Components (Territorial Principle application), Delegation Process
- SPAIN - Maintenance of Military Aeronautical Components (Territorial Principle application)
- NETHERLANDS - Maintenance of Military Aeronautical Products - Support to NLD F-35 Program
- NORWAY - Maintenance of Military Aeronautical Products - Support to NOR F-35 Program
- UK - Maintenance of Military Aeronautical Products - Support to UK F-35 Program

SUMMARY



WHAT IS RECOGNITION



THE EUROPEAN VISION: THE MAWA PROJECT



RECOGNITION CRITERIA



MX ORGANISATION APPROVAL BY RECOGNITION

MX ORGANISATION APPROVAL BY RECOGNITION

FULLY DEVELOPED IMPLEMENTATION SCHEME




**Recognition
Implementing Arrangement**

between the
**National Military Airworthiness Authorities
of**

GERMANY



Luftfahrtamt der Bundeswehr (LufABw)

German Military Aviation Authority

and

ITALY



Direzione degli Armamenti Aeronautici
e per l'Aeronavigabilità (DAAA)

Directorate of Aeronautical Armaments and Airworthiness

RIA Version: 3.0

REL TO: Gov use, NATO, EDA, Contractors - Not for public dissemination

UNCLASSIFIED

1

- TECH ANNEX #1: Maintenance of Military Aeronautical Components

- MO Approvals issued by the Parties are mutually accepted.
- EMAR Forms 1, issued under the other NMAA's Approval, can be consumed.

- TECH ANNEX #2: Maintenance of Military Aeronautical Products

- MO Approvals issued by the Parties are mutually accepted.
- CRS and EMAR Forms 1, issued under the other NMAA's Approval, can be consumed.

- TECH ANNEX #3: Approval of Maintenance Organisations – Delegation process

- Extension of MO Approvals with Line Stations located in the other Party's territory.
- NMAA with territorial competence can activate auditors of the other Party.

MX ORGANISATION APPROVAL BY RECOGNITION

TECH ANNEXES FUNDAMENTAL PRINCIPLE

TERRITORIAL PRINCIPLE

- Organisations are managed (approval and continued surveillance) by the **domestic recognized NMAA** in whose territory the principal place of business of the organisation is located.
- The Approvals encompass components and/or products (addressing also peculiar national requirements, if any) destined to the recognizing NMAA, which is relieved from issuing its own Approval.
- Industry also benefits from avoiding multiple Approval holdership and interfacing a single cognizant statutory Authority.



MX ORGANISATION APPROVAL BY RECOGNITION

TECH ANNEX #2: Maintenance of Military Aeronautical Products

INSTANDHALTUNGSBETRIEB GENEHMIGUNGSVERZEICHNIS

MAINTENANCE ORGANISATION APPROVAL SCHEDULE

Name der Organisation: General Atomics AeroTec Systems GmbH

Organisation name:

Referenznummer: LufABw-145-013-21

Reference:

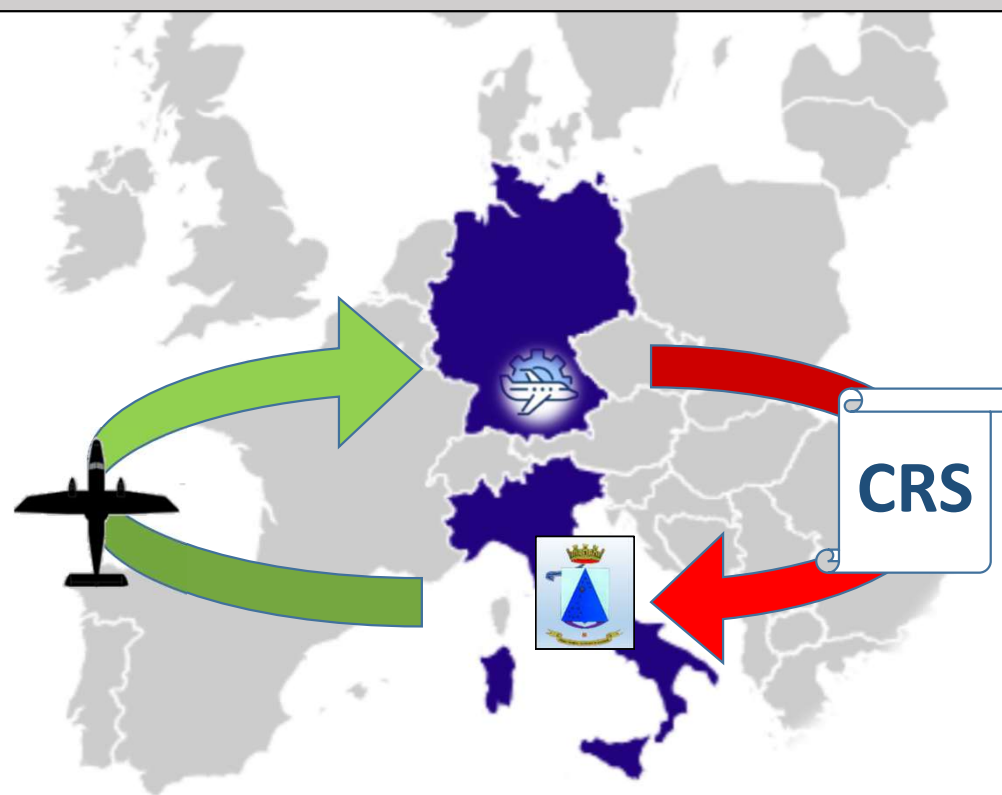
Klasse / Class	Kategorie / Rating	Einschränkung / Limitation	"BASE" Base Maintenance	"LINE" Line Maintenance
Luftfahrzeuge / Aircraft	A1 Militärische Flugzeuge / Milit. aeroplanes	Dornier 228	Ja / Yes	Ja / Yes
	A3 Militärische Hubschrauber / Military helicopters	NH90 NTH NH90 TTH	Ja / Yes	Nein / No

Klasse / Class	Kategorie / Rating	Einschränkung / Limitation
KOMPONENTEN, außer komplette Triebwerke oder Hilfsaggregate (APU) COMPONENTS other than complete Engines or APU	CS4 Rettungssysteme- & Sicherheitsanlagen / Crew Escape & Safety	NH90 Emergency Floatation System (EFS) 95-61 Front, 95-62 Rear Details Capability List (VA-MA 01/01-DEMAR)

Dieses Genehmigungsverzeichnis ist auf die im Abschnitt „Arbeitsumfang“ des gemäß DEMAR 145 genehmigten Instandhaltungsbetriebshandbuchs aufgeführten Produkte, Bauteile und Geräte sowie Tätigkeiten beschränkt.
This approval schedule is limited to those products, parts and appliances and to the activities specified in the scope of work section contained in the DEMAR 145 Approved Maintenance Organisation's Exposition.

Referenznummer des Instandhaltungsbetriebshandbuchs: IBH-LufABw-145-013-2

Maintenance organisation exposition reference:



MX ORGANISATION APPROVAL BY RECOGNITION

TECH ANNEX #3: Approval of Maintenance Organisations – Delegation process



INITIAL APPROVAL OF GERMAN COMPANY

- Base Maintenance Approved by LufABw (territorial principle).



NEW LINE STATION IN ITALY

- German Company applies to LufABw, under DEMAR 145.



RECOGNITION IS INVOKED

- LufABw sends Delegation Request (line station audit) to DAAA.



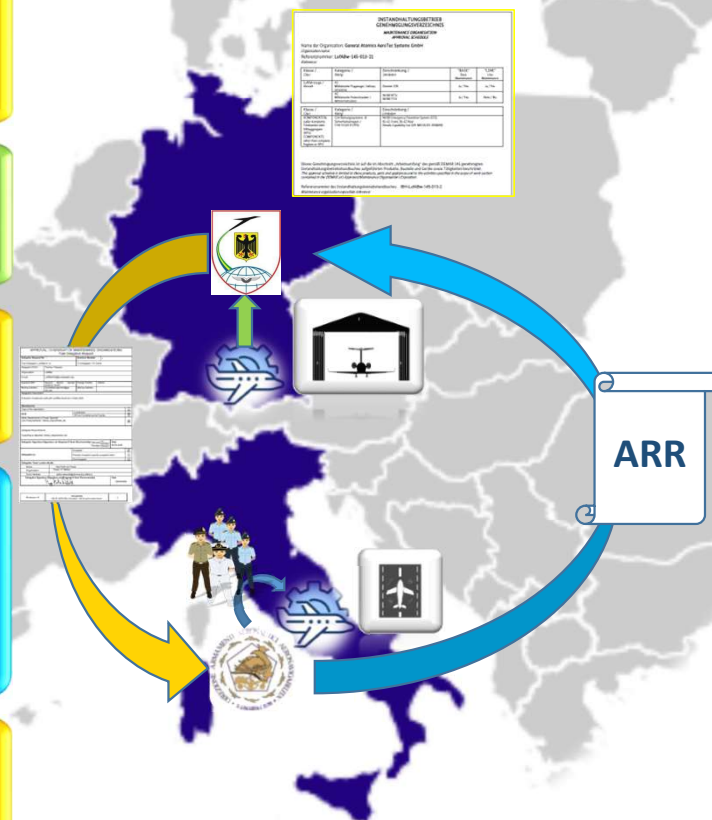
SERVICE IS PROVIDED

- DAAA accepts Delegation;
- DAAA Auditors review documentation and execute audit;
- Audit Report Recommendation sent to LufABw.



APPROVAL REVIEW

- LufABw evaluates the recommendation;
- Approval is updated if DEMAR 145 conditions are met.





THANK YOU FOR YOUR ATTENTION

DIREZIONE ARMAMENTI AERONAUTICI E PER L'AERONAVIGABILITA'



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#MAC25

MAWA Conference 2025

Feedback on the issuance of an EMAR 145 approval to an organization located outside the EU

Col Thierry Schuster
DSAÉ Deputy airworthiness director
French State Aviation Safety Authority

Michael Fella
GA-ASI Director of Depot Operations
EMAR/FR 145 Workshop Manager

October 8, 2025



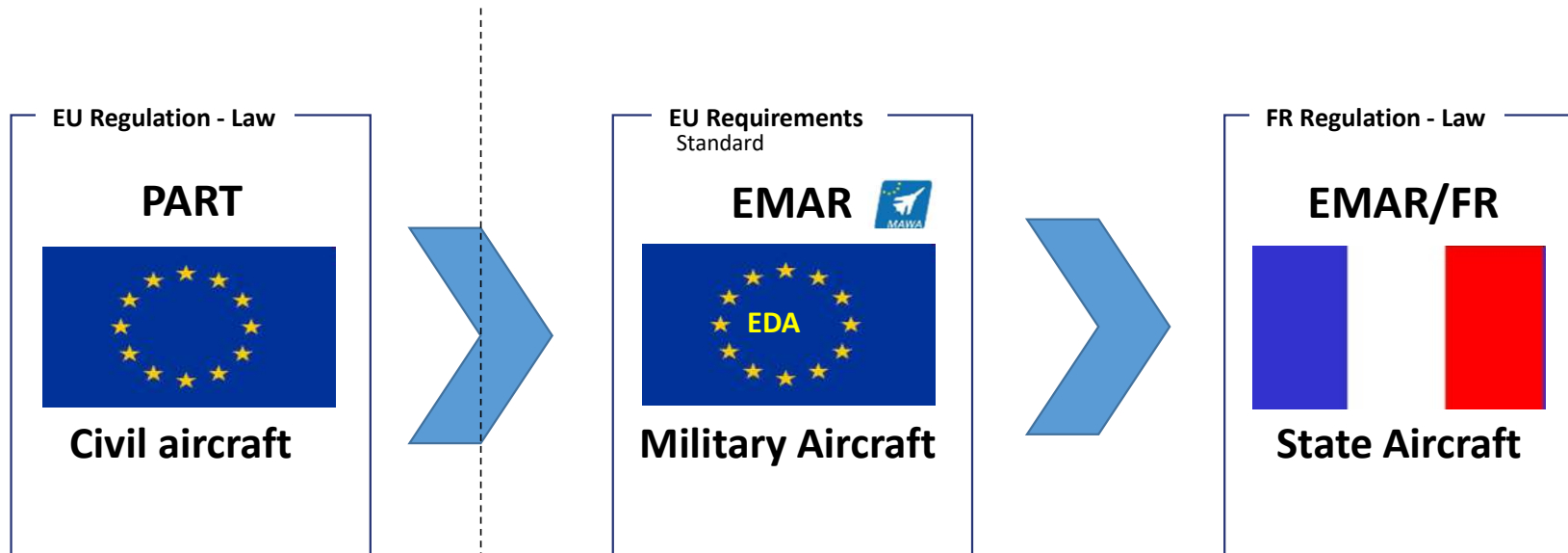
Aeronautical Systems Proprietary Information



Summary

- 1. Rules and regulation
- 2. French AW stakeholders
- 3. DSAÉ Resources
- 4. Steps of an EMAR/FR approval project
- 5. GA-ASI feedback on pursuit to achieve EMAR/FR 145 CAT C Approval
- 6. To Take Away

1. Rules and regulation



A specific regulation for State's aviation

- Based on European (civil & military) standards, PART & EMAR
- Applicable to all State aviation aircrafts

2. French AW stakeholders

Civil stakeholders

State Aviation stakeholders

European Commission



- Establishes the essential requirements
- Conduct Type certification
- Approve flight test conditions
- Ensure Continued airworthiness
- Approves Design organisations

Technical Authority



EASA



- Establish the rules for continuing airworthiness



National authorities

CAA



- Issues permit to fly (flight tests)
- Registration of flight test aircraft
- Approves Production organisations
- Appreciates the compliance of new products to the type design

Technical Authority



OSAC

OSAC: Qualified entity acting on behalf of the CAA



- Approves organisations (maintenance, continuing airworthiness management, training)
- Issues maintenance personnel licences
- Issues Individual CoAs
- Registration of aircraft in service



Operators - CAMOS

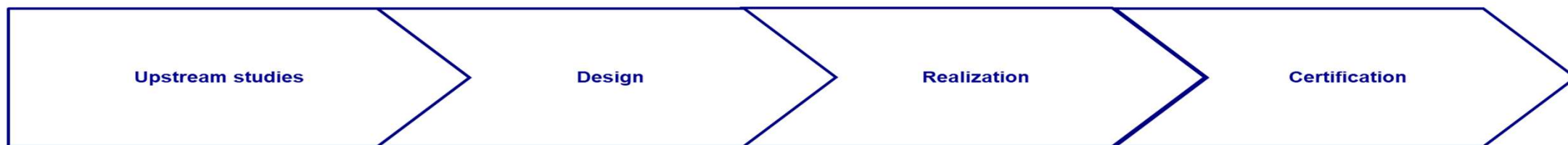
- Apply the rules
- Manage Continuing airworthiness
- Can grant exemptions for urgent operational needs
- Issue permit to fly



3. DSAÉ Resources

- A division in charge of all topics related to continuing AW organizations
- A website <https://www.defense.gouv.fr/dsae> where you can find
 - EMAR/FR regulation with MAC and GM (in French)
<https://www.defense.gouv.fr/dsae/espaces-documentaires/espace-documentaire-dirnav/textes-reference>
 - Guidelines (GUI-D-005 , GUI-145-001) (in French)
<https://www.defense.gouv.fr/dsae/espaces-documentaires/espace-documentaire-dirnav/guides-procedures-emarfr>
- An Email address dsae-dirnav-divorg.chef-div.fct@intradef.gouv.fr for
 - Information and application
 - Obtaining the courtesy translation in English of EMAR/FR regulation
 - For PART145 approved organization, obtaining an early version of specific guidelines

4. Steps of an EMAR/FR approval project



- | | | | |
|---|--|---|--|
| <ul style="list-style-type: none">• Assimilation of regulation and guidelines• Identification of gaps to c/w EMAR/FR | <ul style="list-style-type: none">• Draft of the MOE• Establishment of the Capacities list• Establishment of the certifying staff list | <ul style="list-style-type: none">• Staff training,• Setup Information System• Acquisition of Maintenance Datas, Tools, Spare parts...• Internal Audit | <ul style="list-style-type: none">• Official application• DSAÉ onsite audit• (correction of level 1 findings)• Approval of the MOE and delivery of Approval Certificate |
|---|--|---|--|

MAWA (MAC) Conference 2025

GA-ASI feedback on pursuit to achieve EMAR/FR 145 CAT C Approval

GA-ASI activities prior to EMAR/FR 145 CAT C Application submittal:

- Perform compliance checklist review of EMAR/FR 145 regulations
 - Verify where GA-ASI met the requirements
 - Identify process gaps where GA-ASI needed to improve or create new processes to meet regulatory requirements
 - Duration: ~ 4 - 6 months
- Development of Maintenance Organization Exposition (MOE)
 - Draft MOE, Capability List, Roster
 - Discussions conducted with DSAE on waivers to specific requirements
 - Duration: ~ 6 - 8 months
- Internal audit of GA-ASI MOE against regulatory requirements
 - Internal Audit Findings required to be addressed prior to EMAR/FR 145 application submittal
 - Duration: ~ 4 - 6 months
- Submit official application to DSAE for EMAR/FR 145 CAT C Approval
 - Form 2 application submittal (B & C-Ratings requested)
 - Form 4 Holders (Acct Manager, Workshop Manager, Quality Manager)
 - Duration: ~ 2 weeks

MAWA (MAC) Conference 2025

GA-ASI feedback on pursuit to achieve EMAR/FR 145 CAT C Approval

Activities GA-ASI conducted with DSAE prior to EMAR/FR 145 CAT C Approval:

- DSAE accepts application and performs Desktop Audit of GA-ASI MOE
 - DSAE verify where GA-ASI meets the regulatory requirements, identify gaps or improvements needed in MOE
 - Reviews training requirements for rostered staff, linkage to C & B-Ratings
 - Duration: ~ 2 months
- DSAE performs onsite audit of GA-ASI and MOE, issue official audit report by DSAE
 - Must provide corrective action plan to authorities within 30 days after completion of audit
 - All Level 1 audit findings required to be addressed and corrective actions must be accepted by DSAE prior to EMAR/FR 145 approval can be issued
 - Level 2 findings only need to have a corrective action plan accepted to meet regulatory requirements
 - Duration: ~ 2 months
- Address Audit Findings from DSAE Onsite audit, attain agreement all findings/corrective actions / corrective actions plans (Level 2) have been addressed
 - Level 1 Audit Findings needed to be addressed prior to EMAR/FR 145 approval
 - Duration: ~ 2 - 6 months

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GA-ASI feedback on pursuit to achieve EMAR/FR 145 CAT C Approval

Applicants should allocate sufficient time for approval

Typical Activity	Min (mo)	Max (mo)
Perform compliance checklist review	4	6
Development of Maintenance Organization Exposition (MOE)	6	8
Internal audit of GA-ASI MOE	4	6
Submit application to DSAE	0.5	0.5
DSAE acceptance and desktop audit	2	2
DSAE onsite audit of GA-ASI	2	2
Address audit findings and implement corrective actions	2	6
Totals	~21	~31

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GA-ASI feedback on pursuit to achieve EMAR/FR 145 CAT C Approval

General Feedback by GA-ASI on EMAR/FR 145 approval process:

- Training and linkage to B & C-Ratings for rostered staff
 - Training requirements defined for each B & C-Ratings
 - Artifacts to demonstrate compliance to training requirements
 - Rostered Certifying Staff needed to meet all technician training requirements along with Quality inspector requirements
- Capability Lists
 - B & C-Ratings link to specific P/Ns
 - Level of maintenance conducted for each part
 - Inspect, Test, Repair, Overhaul, Modified
- Use of EMAR Return to Service Forms (Form 1s & Form 8s)
 - Development of automated form tool
 - Development of lockouts for non-rostered staff
 - General awareness training for certifying staff on limitations of their approval

6. To Take Away

- A necessary dialog to avoid misunderstanding
 - Ensure agreement with Regulatory Authorities on compliance approach as early as possible
 - Example: UAV Ground Control Station (GCS) not considered an airworthy system/part of air vehicle (i.e. falls outside scope of approval)
- Some specific EMAR topics to study in priority
 - Perimeter of approval : [shop ≠ rating](#)
 - Certifying staff assessment
 - Operators Learning Management System
 - Maintenance data : AD watching -> EMAR/FR : watching AD from DGA
- Perform thorough internal audit activities as preparation for regulatory audits
 - Demonstrate compliance to regulations through artifacts (record, certification, documentation)
 - If you cannot clearly demonstrate compliance, then you are likely non-compliant



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EASA challenge for the future:

Integration of Disruptive Innovation

Towards an Operation Centric Certification



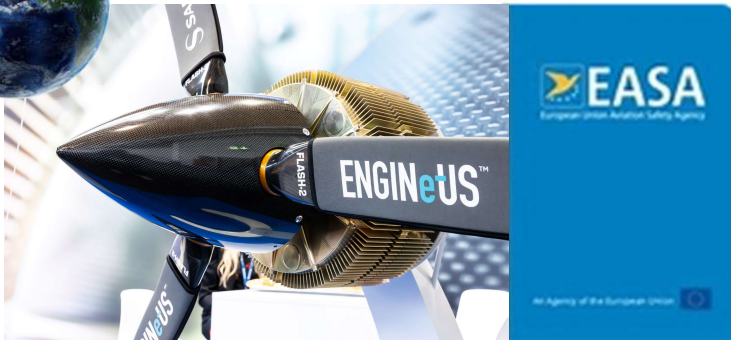
Alain Leroy

EASA Chief Engineer & Executive Safety Advisor

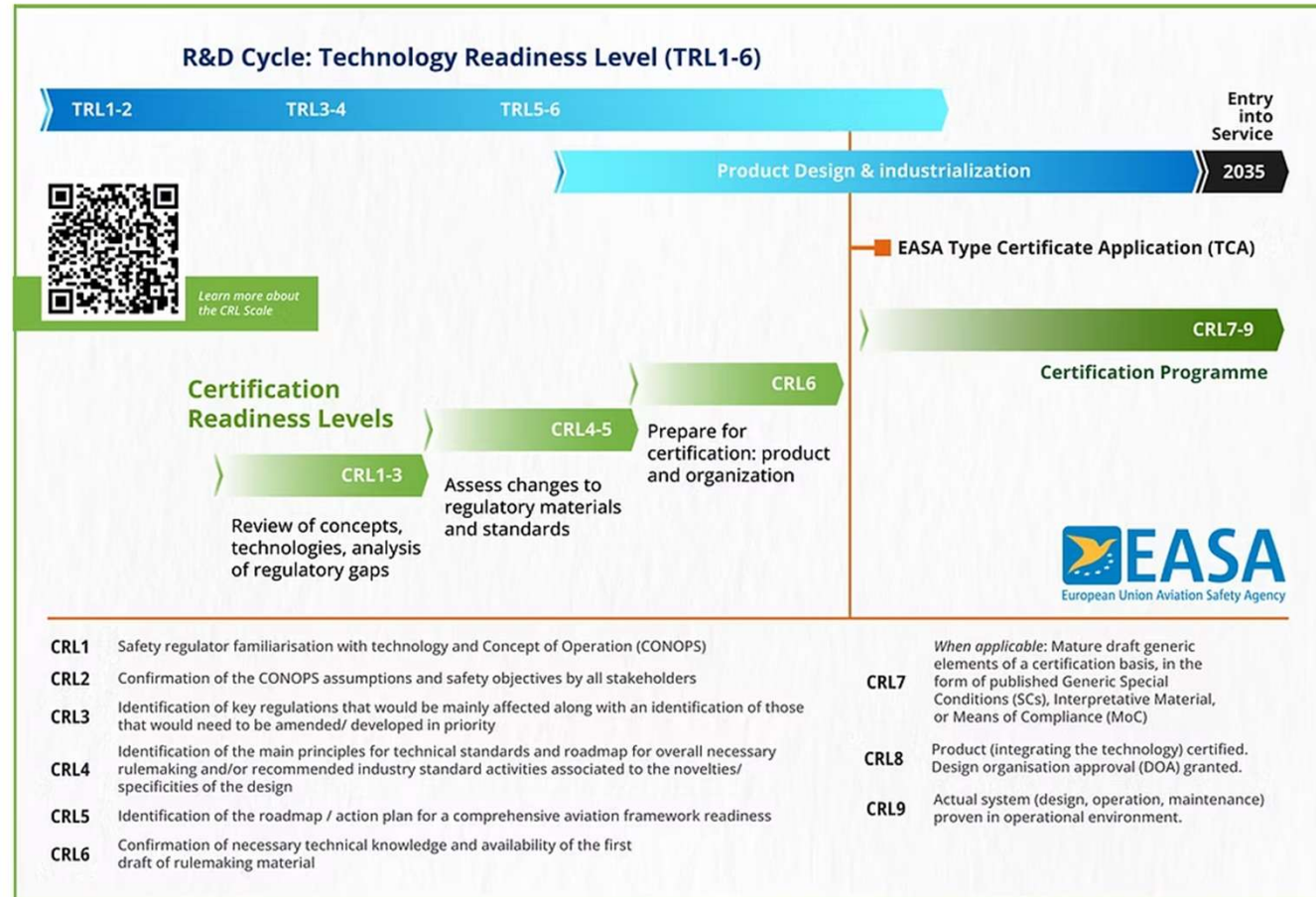
Is regulation against innovation?



June 10, 2020



February 4, 2025



Integration of New Technologies: how to find the right balance?

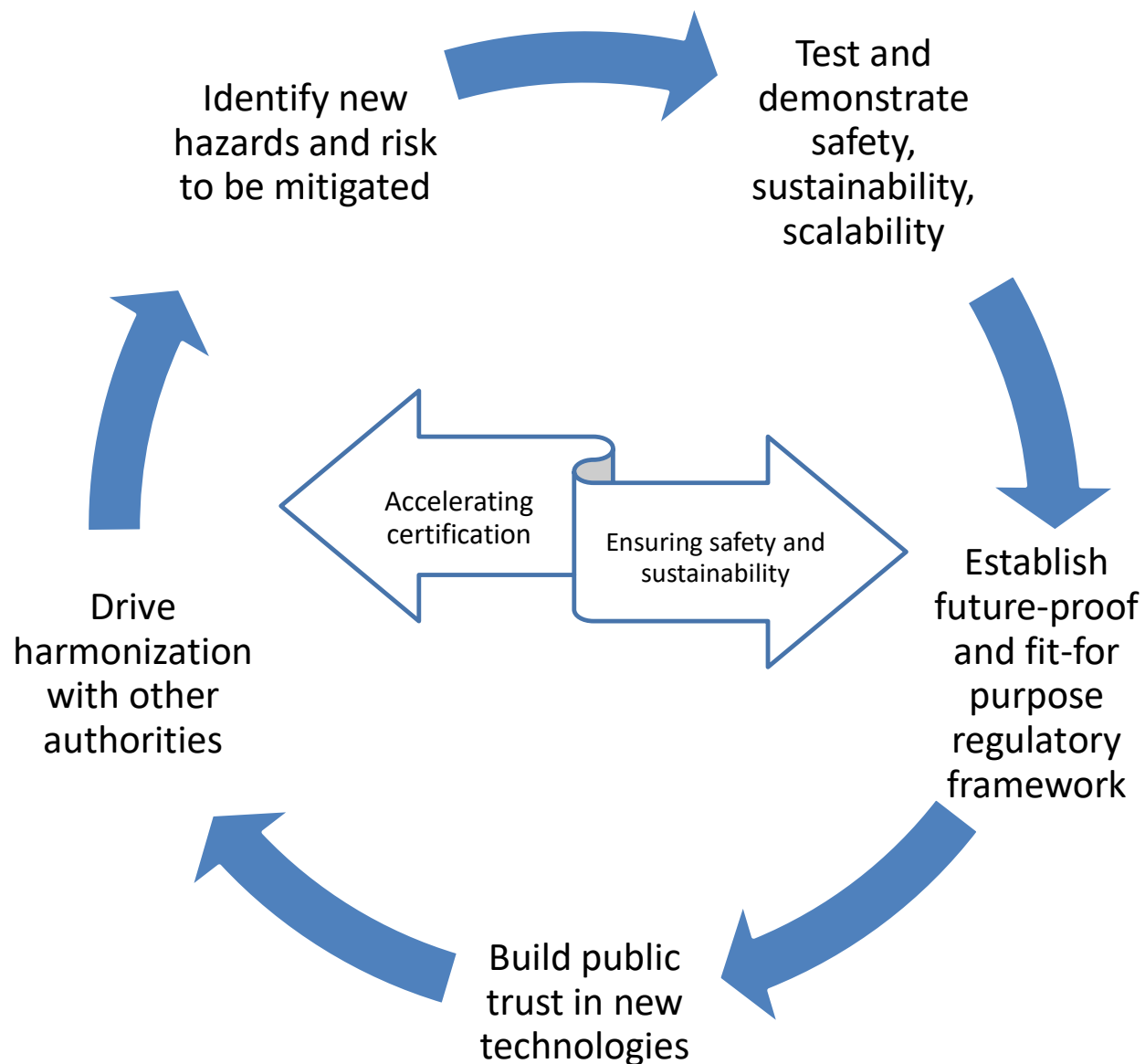
- ❖ Define clear Safety Objectives and Concept of Operations (CONOPS)
- ❖ Move Toward “Operation Centric Certification”
- ❖ Apply Proportionality and Net Safety Benefit approach
- ❖ Use Sandboxes for real life testing of new regulatory frameworks and safety objectives
- ❖ Assess maturity of technologies using the Certification Readiness Level scale



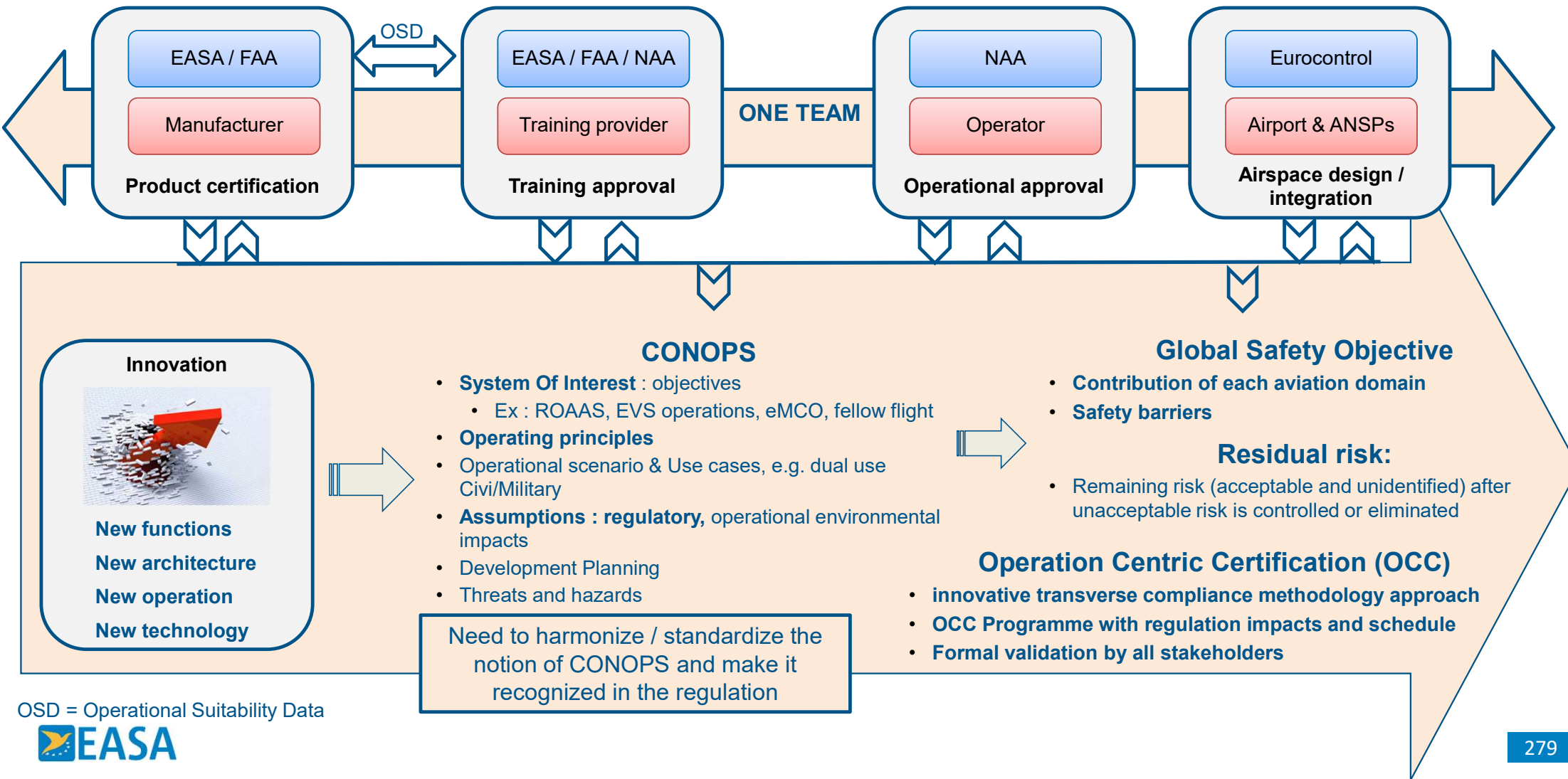
New needs (Military included)



**A safe and
competitive aviation
industry
to address them**



New Way of Working towards Operation Centric Certification



The Innovation Actors and the Regulatory Sandbox

- ❖ Establishing sandboxes to learn and better understand how to ensure safety before regulating



use of existing
regulatory framework

amendment of existing
regulatory framework

creation of new
regulatory framework

Thank you for your attention



easa.europa.eu/connect



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UAS WAY AHEAD



SYNERGIES



JCGUAS Ops Syndicate

- ▶ R2I
RPAS Readiness Initiative
- ▶ Project X (2022)
Project SAPIENCE (2026)
- ▶ STANAGS
STANRECs
- ▶ NATO Autonomy
Implementation Plan
- ▶ Ops & Trg RISK BASED



EDA UAS User Community

- ▶ Accommodation-integration of
MALE RPAS in Airspace
- ▶ AI and Autonomy
Projects/Challenges
- ▶ Standardization and
Certification project
- ▶ EU Action Plan on
Autonomous Systems
- ▶ Risk-based (OPS Centric)



EUROPEAN
DEFENCE
AGENCY



DID YOU
SAY
“FUTURE”?



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**Accelerating
the future
of aerospace**

Certification challenges in a changing world

Prof. dr. Arjan de Jong | 09 Oct 2025



Introduction

- Aircraft assessments & development of innovative technologies
- Improve efficiency and effectiveness to deliver more airpower
- Contribute to the success of the warfighters
- Certification and qualification are never far away
 - Tilt rotors
 - Inspection robots
 - Use of Artificial Intelligence (AI)





Changing world

- World changes rapidly
- Urgent need for innovative technologies to counter opponents
- Relentless and ongoing
- Challenge is to stay safe by
 - Creating new capabilities
 - Maintaining airworthiness
- Requires certification at the same pace as innovations



Source: www.defensie.nl



Tilt rotors

- Royal Netherlands Air and Space Forces (RNLASF) explores next generation rotorcraft, including **tilt rotors**
- Pave the way
 - Reduce the complexity of certification
 - Benefit from cooperation
- Two questions
 - Certification basis
 - Civil and/or military



Source: www.bellflight.com



Tilt rotors

Certification basis

- AW609 as an example
- Certification by EASA
- Patrick HADOU, Senior military advisor to the Executive Director
- Certification mix of CS23, 25 and 29, and some specific requirements
- Special conditions, for example tilt rotors and crashworthiness
- AW609 civil certification basis can be basis for military





Tilt rotors

Civil or military certification

- Interviews with stakeholders
- EASA as service provider
 - “As civil as possible,
– as military as necessary”
- EASA options
 - Civil only
 - Dual civil and military
 - Military only
- Interesting approach





Inspection robots

Standard qualifications

- NLR builds inspection robots
- Replace tap tests with thermography
- Tool and Test Equipment (TTE) equivalency
- 80 physical tests
 - Create impact damage
 - Sample measurements
 - Blind tests
- Lot of work and time consuming





Inspection robots

Model-based qualifications

- Qualification is hurdle to innovate (maintenance) technology
- How can we reduce qualification effort?
- Certification by Analysis (CbA)
- Model-based qualifications
 - Easy for simple cases
 - Difficult for edge cases
- Next: define principles and methodology (and guidelines)



Source: nlr



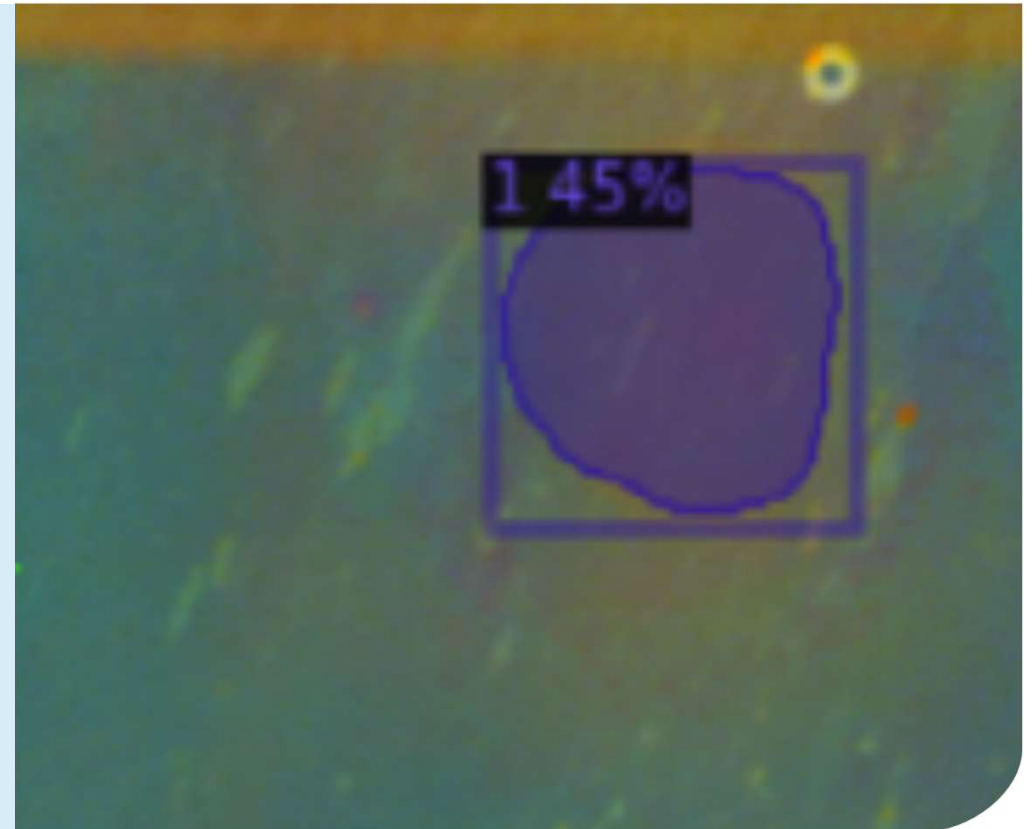
Use of Artificial Intelligence

Context

- Growing role of AI
- For example defect detection
- Must comply with safety standards
- Traditional certification methods not developed with AI in mind

Key challenge

- How to align AI with the traditional certification processes

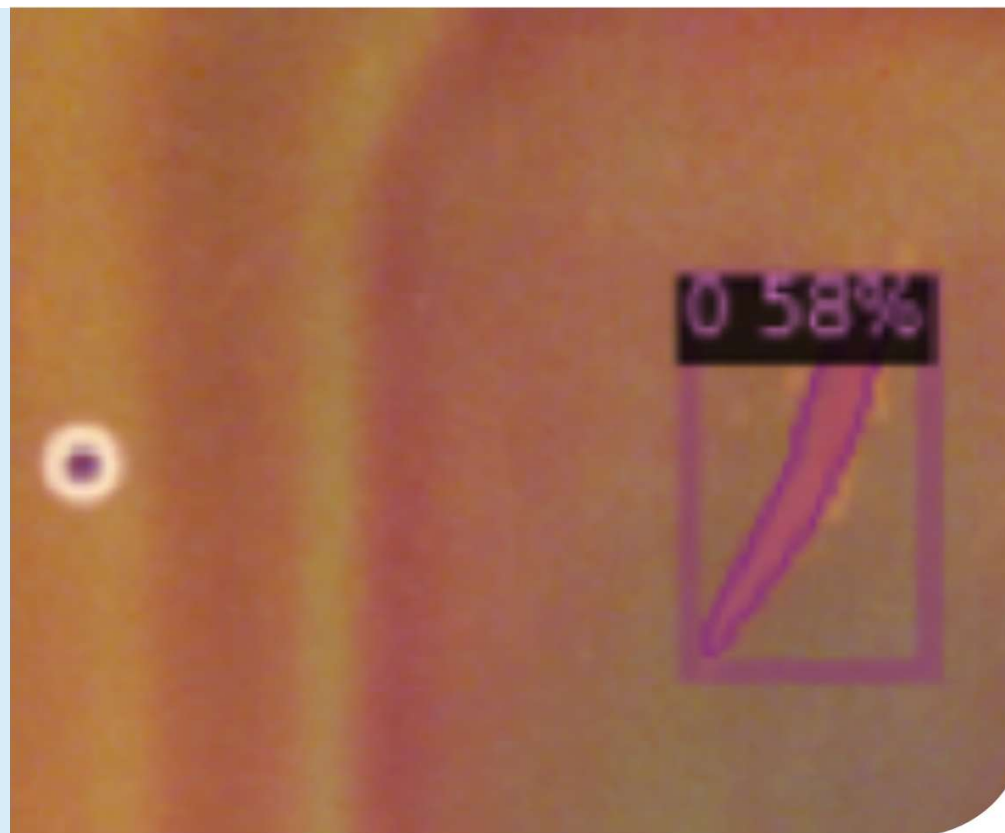




Use of Artificial Intelligence

Issues

- Explainability & transparency
 - AI are black-box models
- Data dependence
 - Garbage-in is garbage-out
- Verification & validation
 - Traditional methods unsuitable for AI systems/algorithms
- AI model updates
 - Re-certification every update

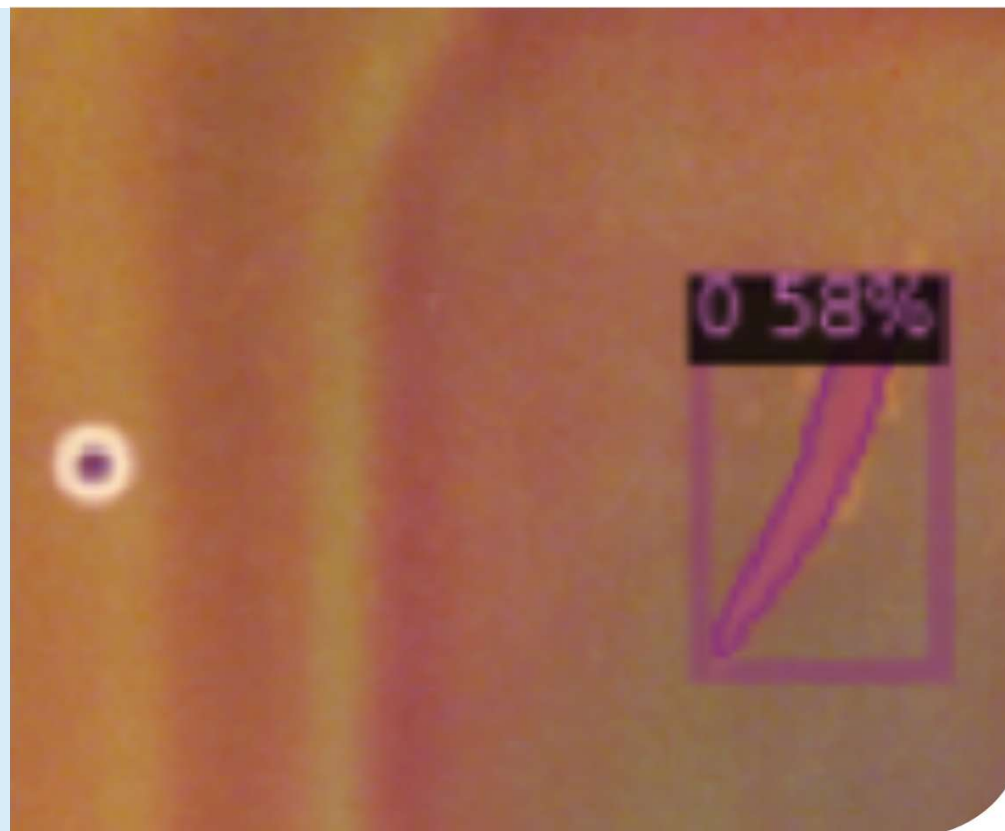




Use of Artificial Intelligence

Developments

- Standards in development
 - EASA, EUROCAE
- New techniques to explain AI
 - Digital twins
 - Runtime monitoring
 - Visual-language models (models that explain what they see)
- Hybrid certification processes
 - Combination of traditional and new ways of certification (such as simulation-based validation)





Key messages – lessons learnt

Observations

- New reality, importance of fast development/innovation cycles
- Innovation requires certification of breakthrough technologies
- Certification is not just supportive in the process, but should be as innovative as these breakthrough technologies
- Can we further cooperate and work on solutions together?





Thank you for your attention!



**Accelerating
the future
of aerospace**

Royal NLR - Netherlands Aerospace Centre

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Koninklijke Luchtmacht

MAC2025 Metal Additive Manufacturing at ASC

Royal Netherlands Air Force
Aeronamic

13 oktober 2025



Agenda

1. RNLAF & Aeronamic
2. Basics of AM
3. Process Overview
4. Success Stories / Current Progress





Introduction

Kees Temminck

RNLAF

Process Engineer



Maarten van Ramshorst

Aeronamic

Process Specialist AM





Koninklijke Luchtmacht

RNLAF & Aeronamic

RNLAF & Aeronamic

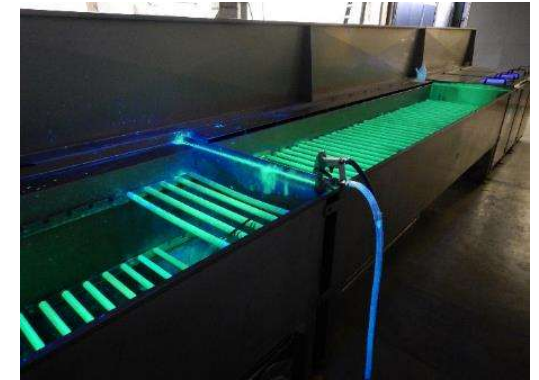
13 oktober 2025

Squadron 981 Component maintenance



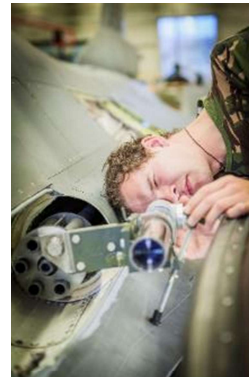


Back shops and special processes

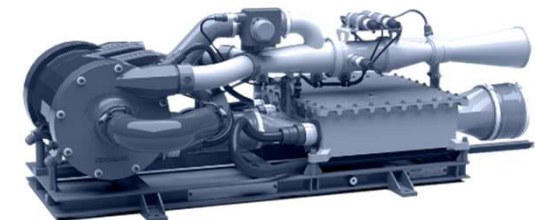
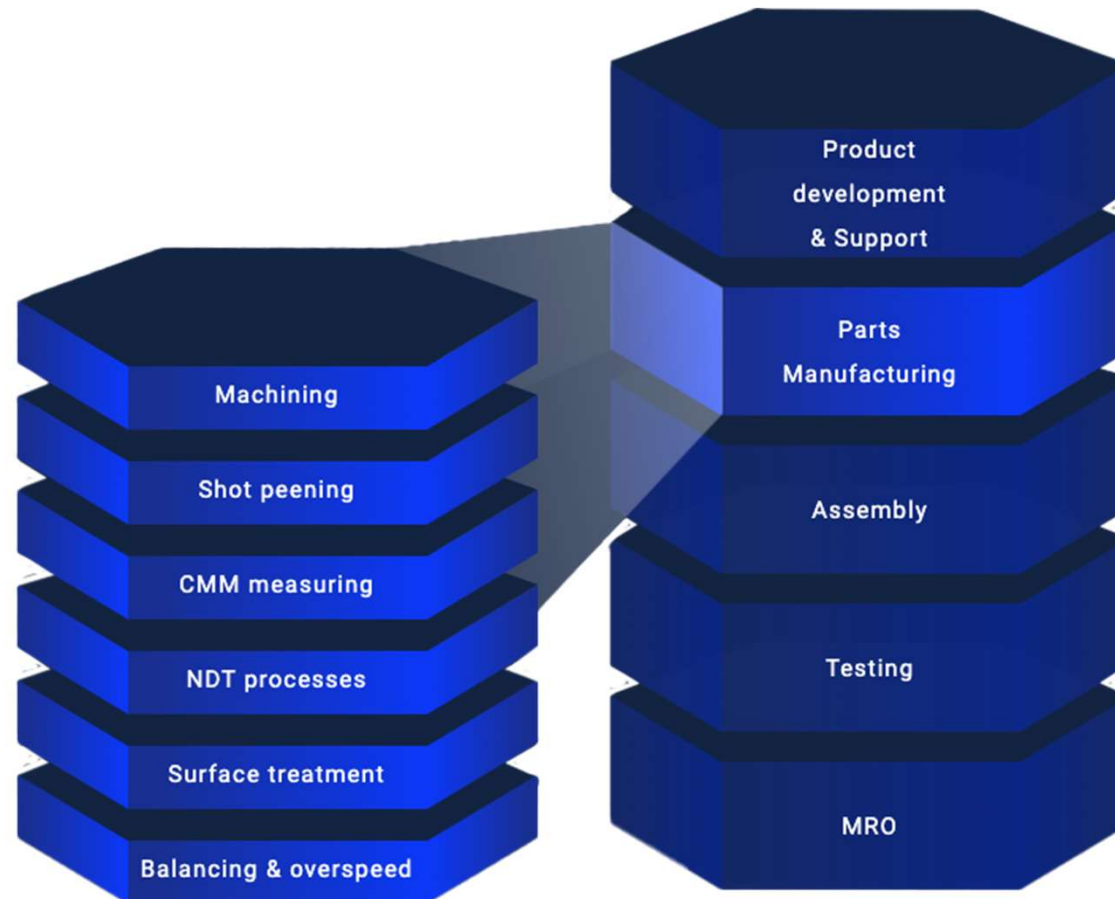




Heli engines, mechanical systems and hydraulics



Aeronamic





Koninklijke Luchtmacht

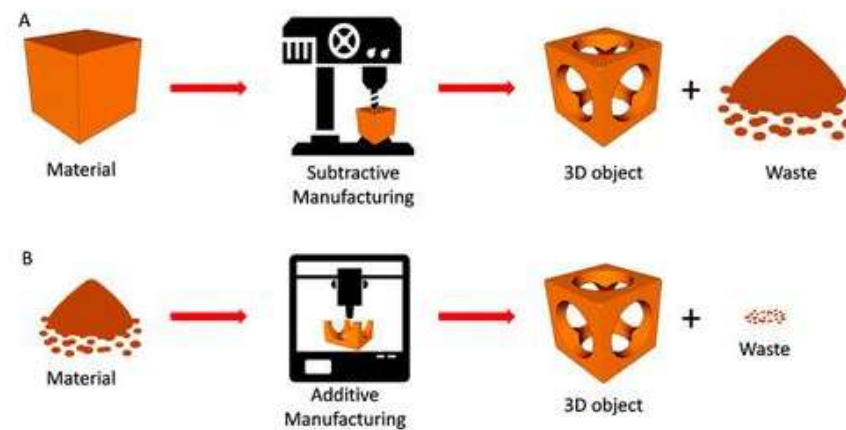
Basics of AM

RNLAF & Aeronamic

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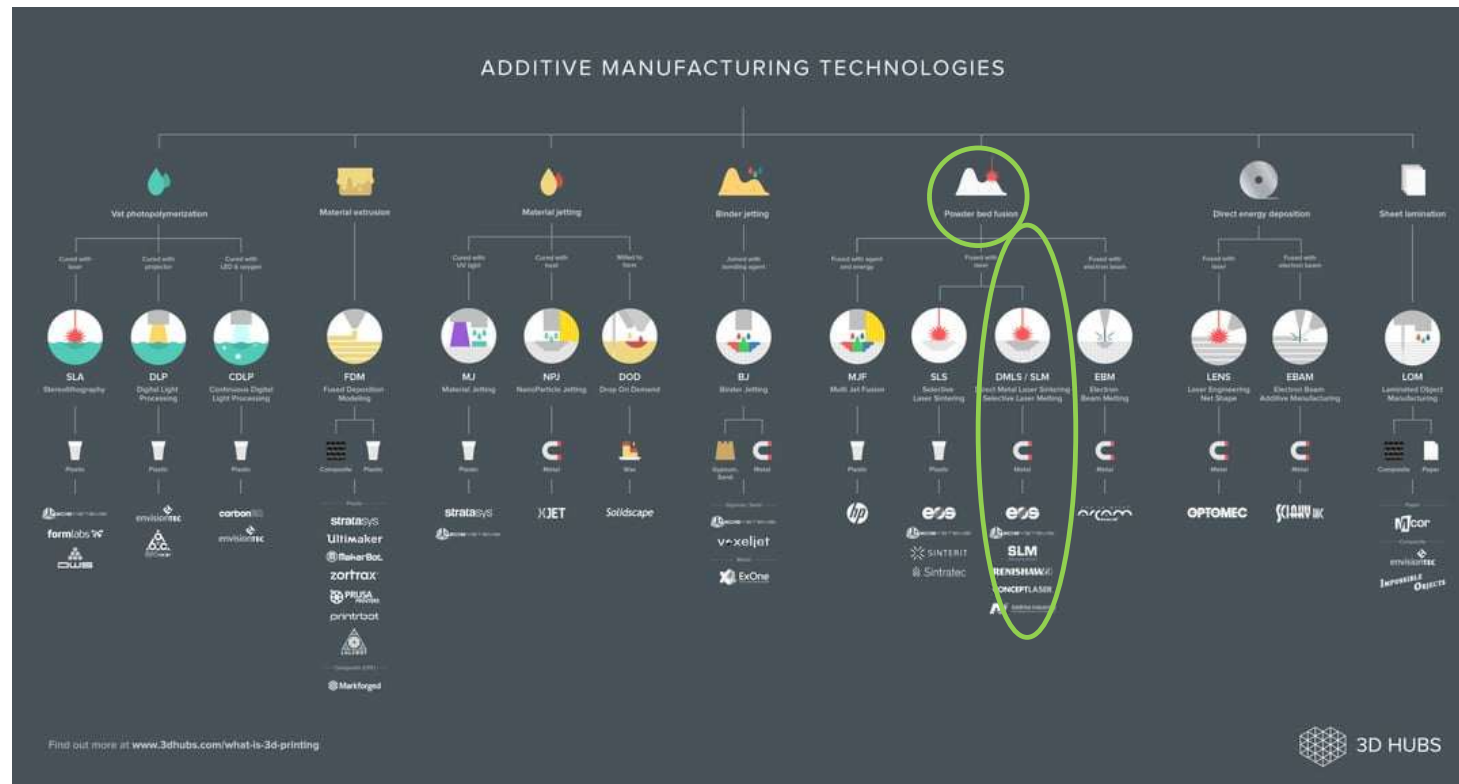


Introduction: Additive Manufacturing



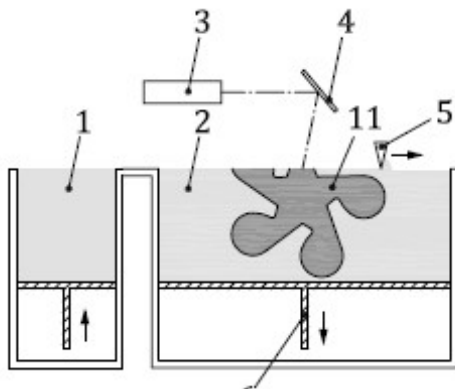


Introduction: Additive Manufacturing





Introduction: L-PBF



AEROSPACE MATERIAL SPECIFICATION

AMS7003™	REV. A
Issued	2018-06
Revised	2022-08
Superseding AMS7003	

Laser Powder Bed Fusion Process

RATIONALE

Specification updated to correct and clarify intent. Key process variables and calibration requirements updated to address user inputs.

1. SCOPE

1.1 Purpose

This specification establishes process controls for the repeatable production of aerospace parts by Laser Powder Bed Fusion (L-PBF). It is intended to be used for aerospace parts manufactured using Additive Manufacturing (AM) metal alloys, but usage is not limited to such applications.

1.2 Safety - Hazardous Materials

While the materials, methods, applications, and processes described or referenced in this specification may involve the use of hazardous materials, this specification does not address the hazards which may be involved in such use. It is the responsibility of the user to ensure familiarity with the safe and proper use of any hazardous materials and to take necessary precautionary measures to ensure the health and safety of all personnel involved.

2. APPLICABLE DOCUMENTS

The issue of the following documents in effect on the date of the purchase order forms a part of this specification to the extent specified herein. The supplier may work to a subsequent revision of a document unless a specific document issue is specified. When the referenced document has been cancelled and no superseding document has been specified, the last published issue of that document shall apply.

2.1 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM E2281 Standard Practice for Process Capability and Performance Measurement

ASTM E2587 Standard Practice for Use of Control Charts in Statistical Process Control

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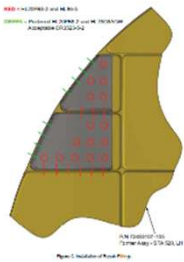
Koninklijke Luchtmacht

Process Overview

RNLAF & Aeronamic

13 oktober 2025

Process overview



1. Needs



3. Inputs

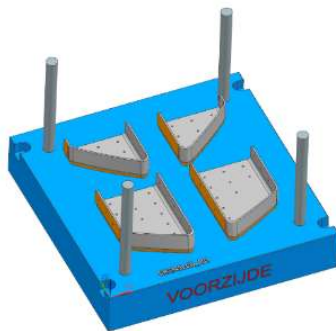


5. HT & build
platform removal



7. Post
processing

2. CAD/CAM



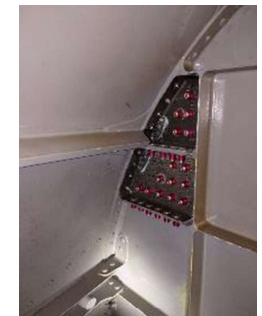
4. Printing
& monitoring



6. Material
certification &
inspection



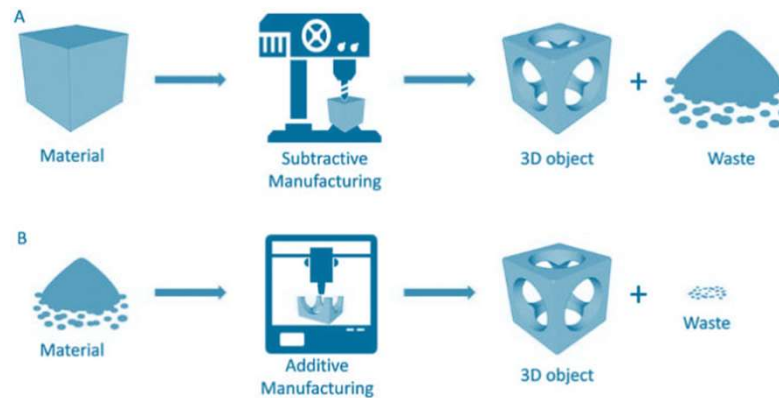
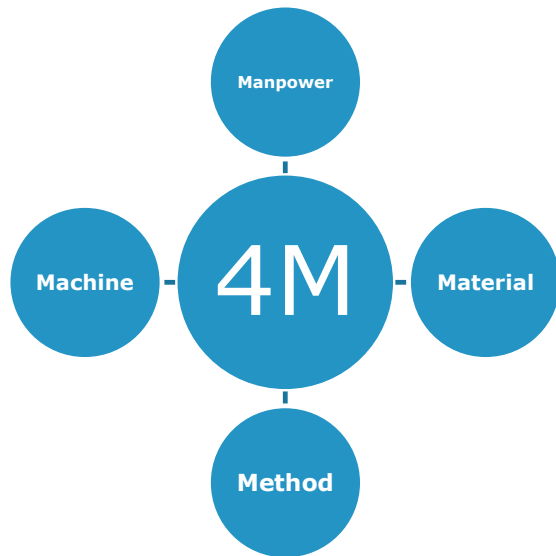
8. Installation
& inspection



Process overview



Needs



ENGINEERING DISPOSITION
H47F-ED-51-206

Branch/Section/Technical Desk: DMO/DWS&B/LUCHTVAART/RWA/CHNOOK Date: 20-3-2023
Weapon system: CH-47F(NL)-MYII Chinook

Number: H47F-ED-51-206	Reference deficiency ¹ : SAP AG 200070467
Issue: A	Date deficiency discovered: 15-3-2023
Date: 20-3-2023	Operating time at failure ² : 630 H
PoC Engineering: B.Kramer	Location deficiency: Station: 520
Bureau: DMO/DWS&B/LUCHTVAART/RWA/CHNOOK	Buttline: 60L
Telephone: +316 51 40 17 96	Waterline: -15
E-mail: B.Kramer@mindef.nl	
Effectivity ³ : Name: LH former STA 520	
Tailnumber: D601	
Partnumber: 72453107-104	
Serialnumber: M7601	

De inhoud van dit document is goedgekeurd door de MTCHO nr. MAA-NLD 21-01 zoals vastgelegd in het bij de documentnummer behorend publicatiedossier. The contents of this document is approved by the MTCHO nr. MAA-NLD 21-01 as documented in the publication dossier associated with this document number.

Deficiency description:

During the C2 check a crack was found at STA 520, WL -15, BL 60L (Ref. Figure 1). A repair for this former is not mentioned in TM 1-1520-271-02-10P_NL. A repair method is requested.

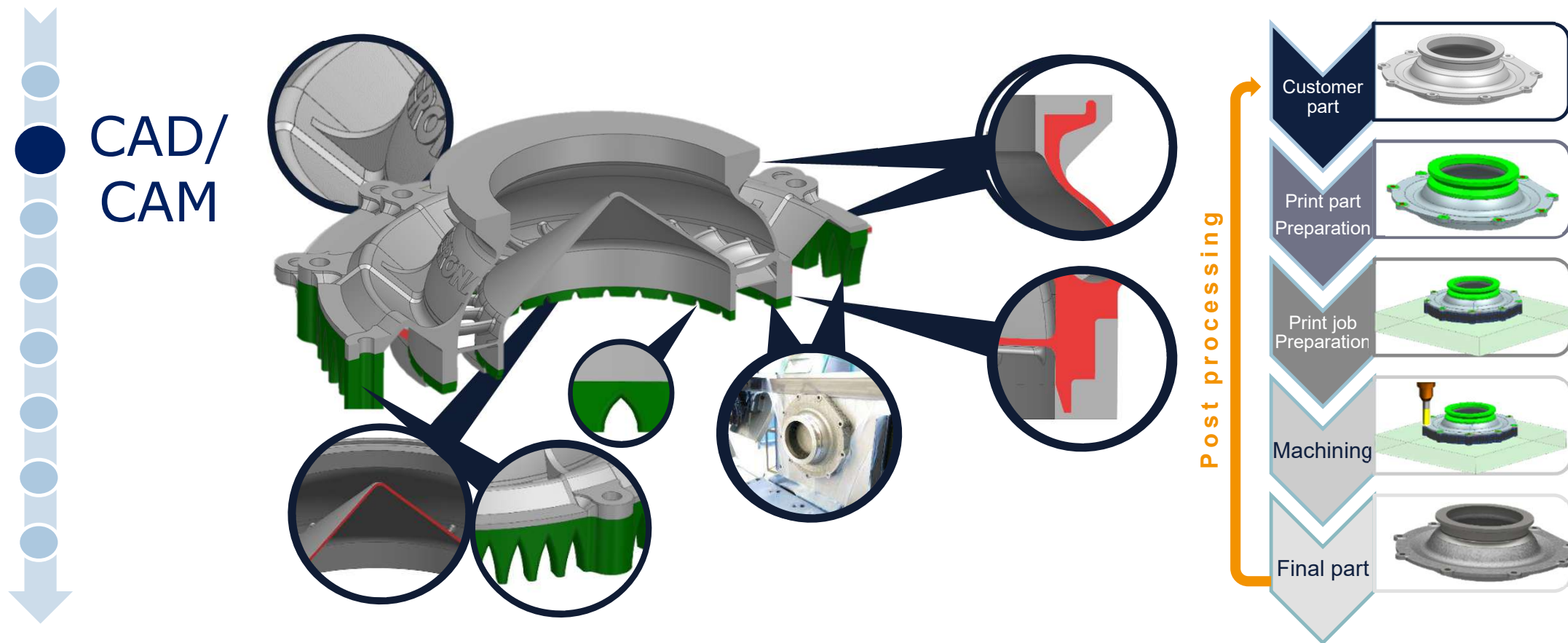
Figure 1. Overview and detail of cracked STA 520 AC D601

¹ For example SAP MS/AG/A1 or MTCHO Form 21-510A
² If applicable
³ Component of aircraft type

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Air Systems Branch
Prestatieweg 1
3584B Utrecht
Netherlands

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MTCHO Form 21-5108 Version 17-1-2023

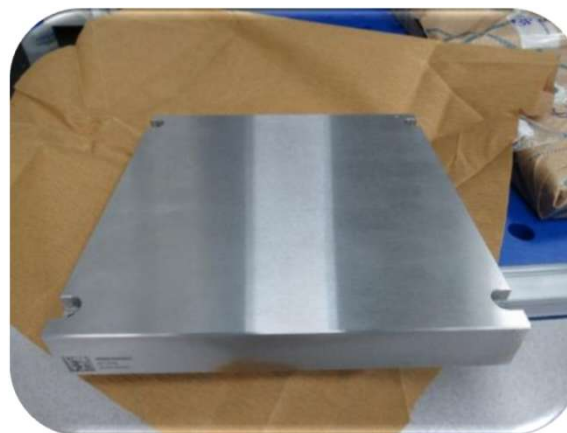
Process overview



Process overview



Inputs



AEROSPACE MATERIAL SPECIFICATION

AMS7031™

Issued 2022-03

Batch Processing Requirements for the Reuse of Used Powder in Additive Manufacturing of Aerospace Parts

Process overview



Printing & monitoring

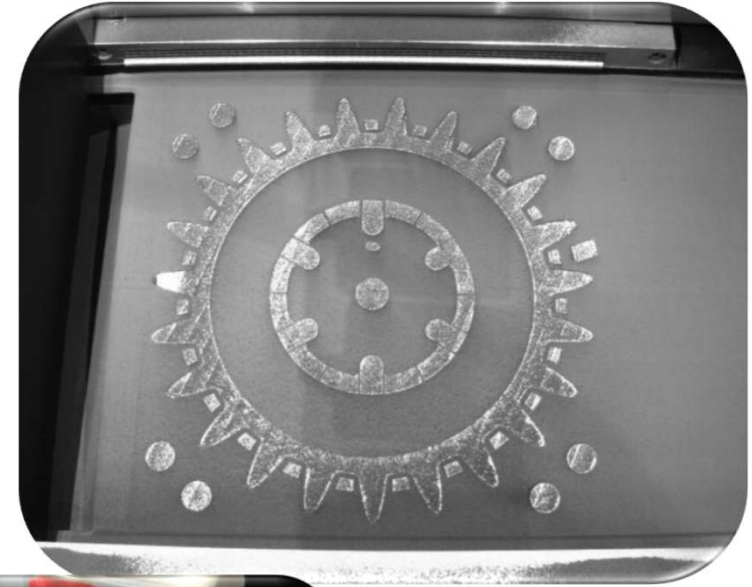


AEROSPACE
MATERIAL SPECIFICATION

AMS7032™

Issued 2022-08

Machine Qualification for Fusion-Based Metal Additive Manufacturing



AEROSPACE
MATERIAL SPECIFICATION

AMS7003™

Issued 2018-06

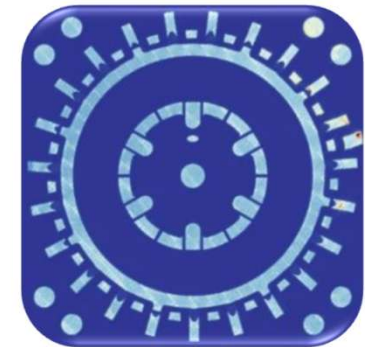
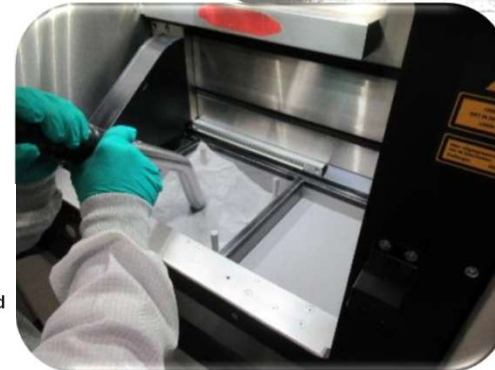
Laser Powder Bed Fusion Process

RATIONALE

ISO/ASTM 52942:2020(E)



Additive manufacturing — Qualification principles —
Qualifying machine operators of laser metal powder bed
fusion machines and equipment used in aerospace
applications¹



Process overview



Heat treatment & build platform removal



AEROSPACE MATERIAL SPECIFICATION	AMS2774™		REV. E
	Issued	1995-07	
	Revised	2016-01	
	Superseding AMS2774D		
Heat Treatment Wrought Nickel Alloy and Cobalt Alloy Parts			

RATIONALE



Process overview



Material inspection & certification



AEROSPACE MATERIAL SPECIFICATION	AMS7006™	
	Issued	2022-03
Nickel Alloy, Corrosion- and Heat-Resistant, Powder for Additive Manufacturing 52.5Ni - 19Cr - 3.0Mo - 5.1Cb (Nb) - 0.90Ti - 0.50Al - 18Fe (Composition similar to UNS N07718)		

RATIONALE

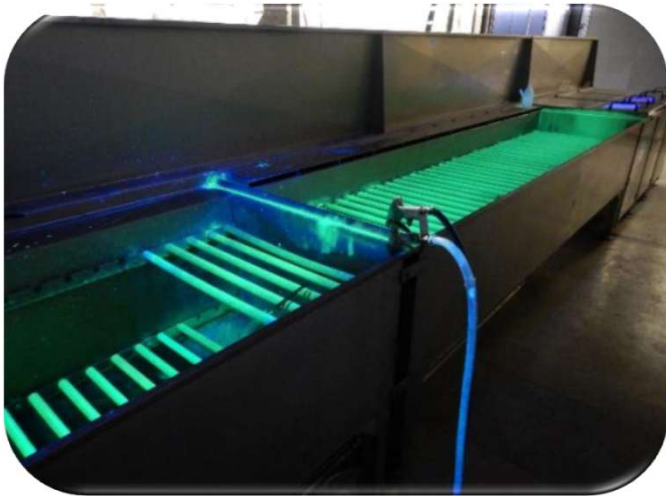
Process overview



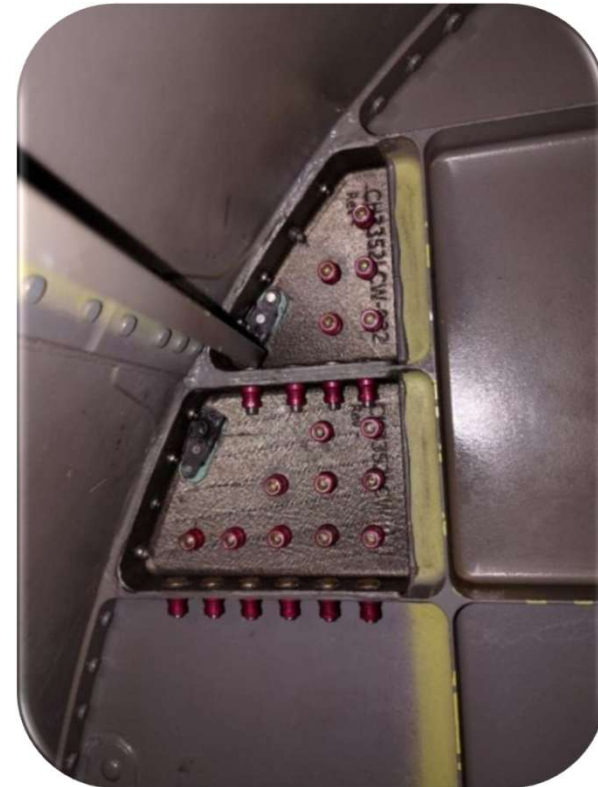
Post
processing



Process overview



Inspection &
installation





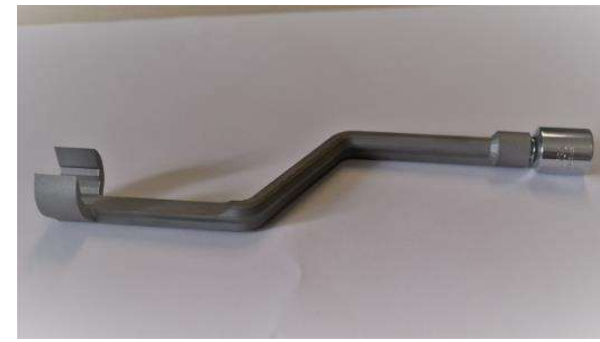
Koninklijke Luchtmacht

Success Stories / Current Progress

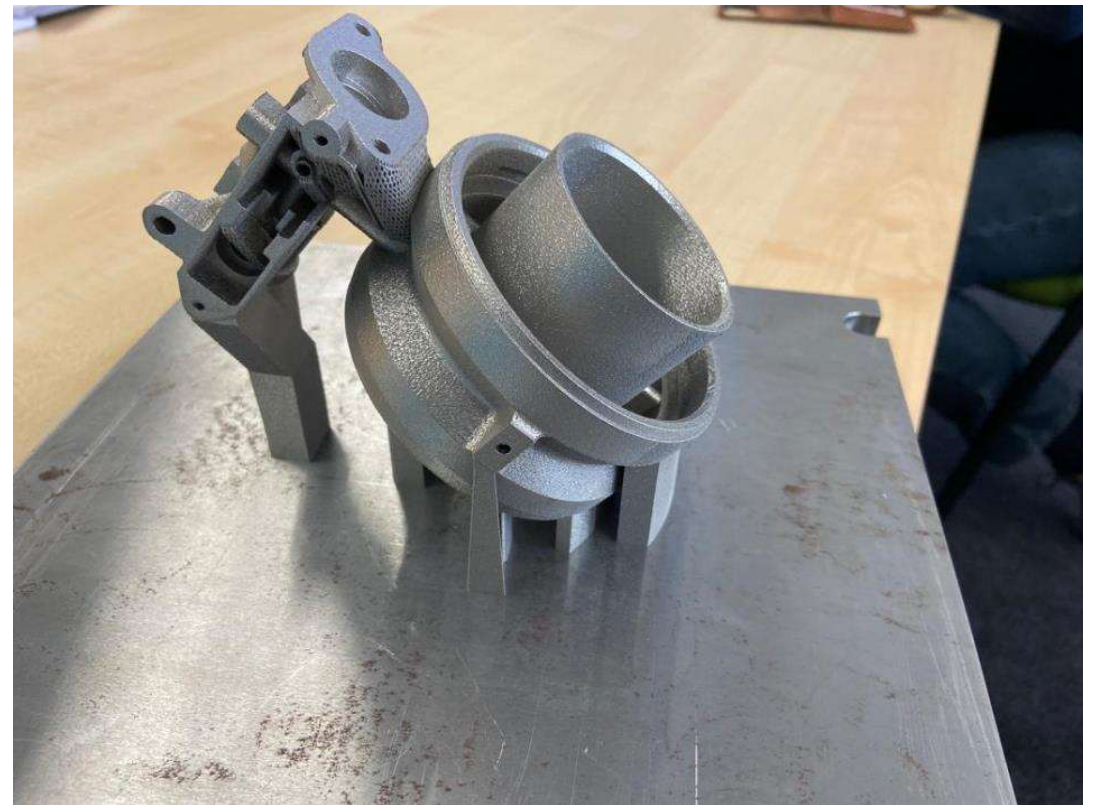
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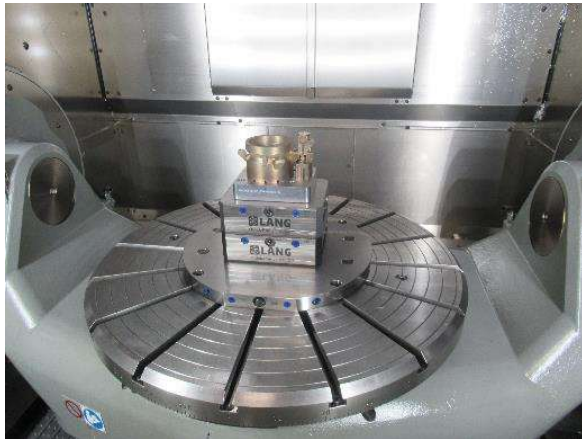
Success Stories



Current progress



Current progress





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