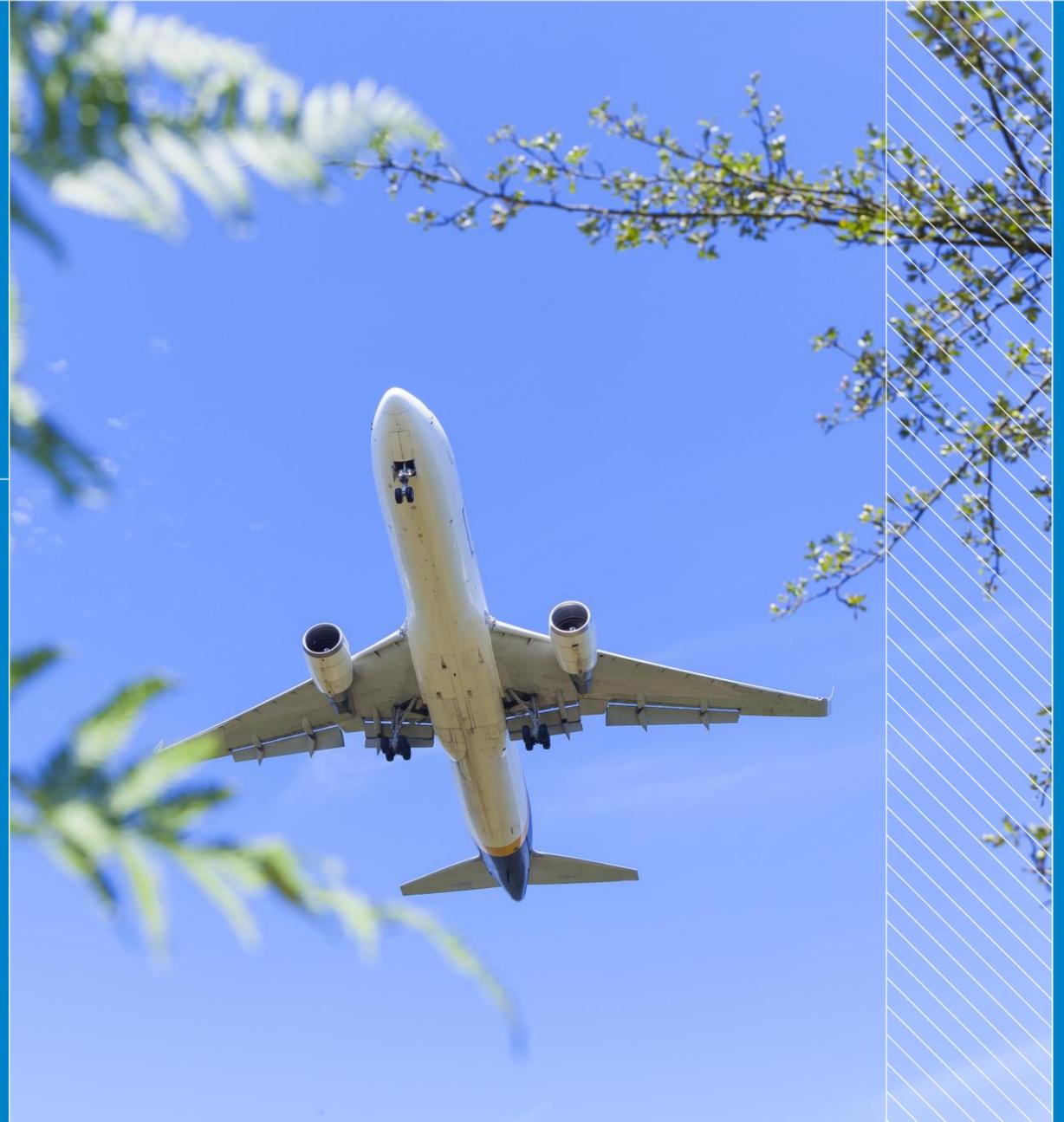


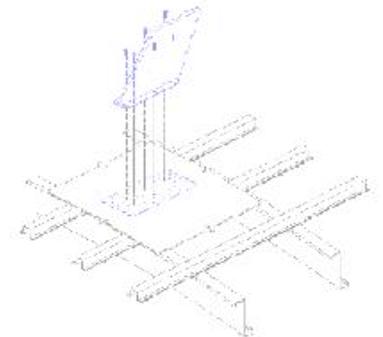
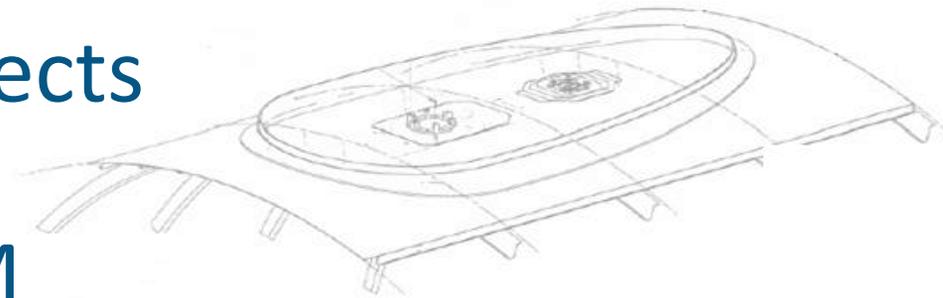
CM-S-013 on Large Antenna Installations

Dr. Wolfgang Hoffmann
Structures Expert &
Project Certification
Manager



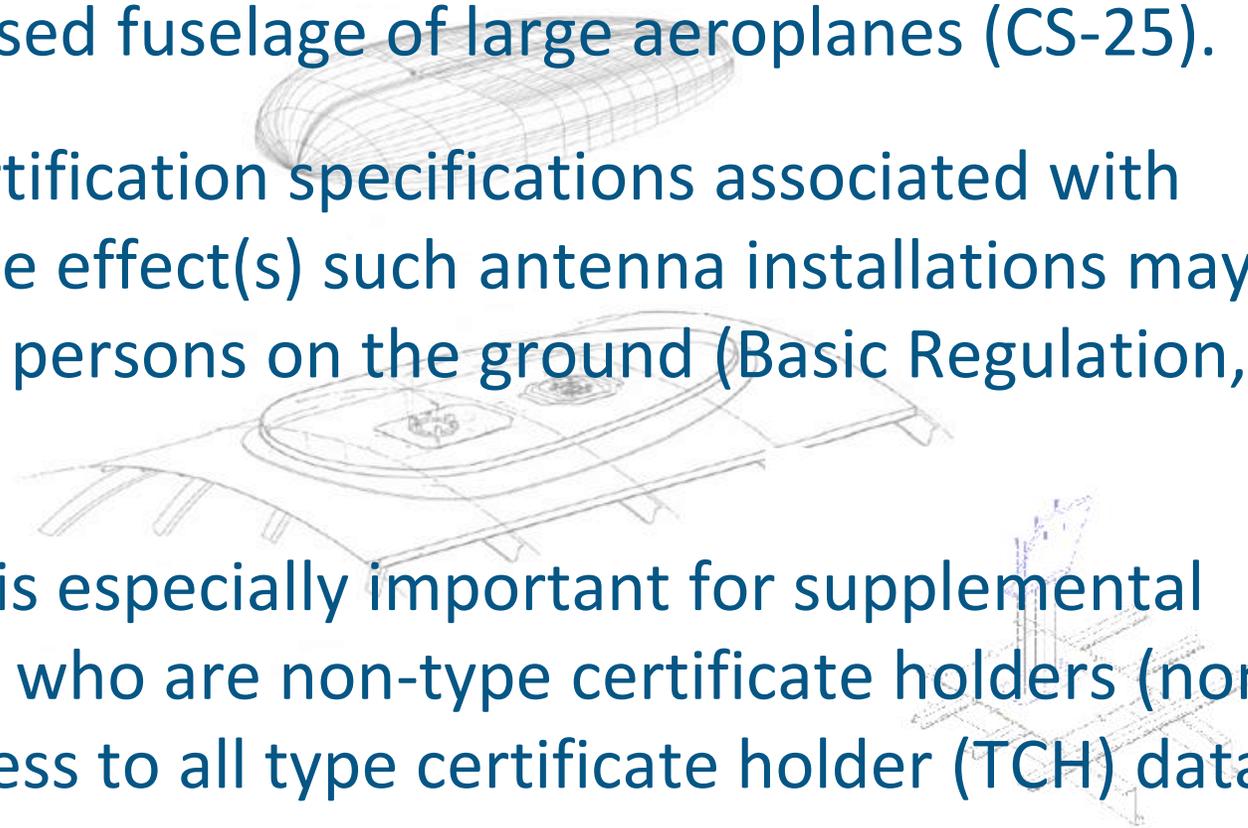
Content

- Purpose of the Certification Memorandum CM-S-013
- Current Regulatory Framework
- Specific elaborated Subjects
- Current Status of the CM
- Outlook



Purpose of the Certification Memorandum CM-S-013

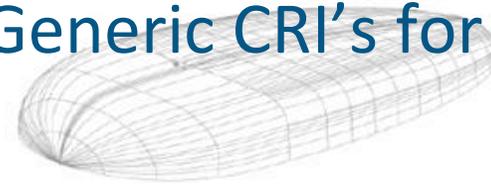
- ▶ Additional guidance regarding installations of (small or large) antennas mounted on top of the pressurised fuselage of large aeroplanes (CS-25).
- ▶ focus on structural (related) certification specifications associated with antenna installations, and/or the effect(s) such antenna installations may have on aircraft structure or on persons on the ground (Basic Regulation, Article 4).
- ▶ applicable to all applicants and is especially important for supplemental type certificate (STC) applicants who are non-type certificate holders (non-TCH), as they may not have access to all type certificate holder (TCH) data required for such installations.



Current Regulatory Framework

- EASA regulatory framework:

- Currently, EASA has defined two Generic CRI's for large antenna installations on CS-25 aircraft:



- “Structural certification criteria for large antenna installations”

- “Vibration & buffeting compliance criteria for large external antenna installations”

- Both CRI's are based on FAA Generic IP's, with similar (but not identical) content

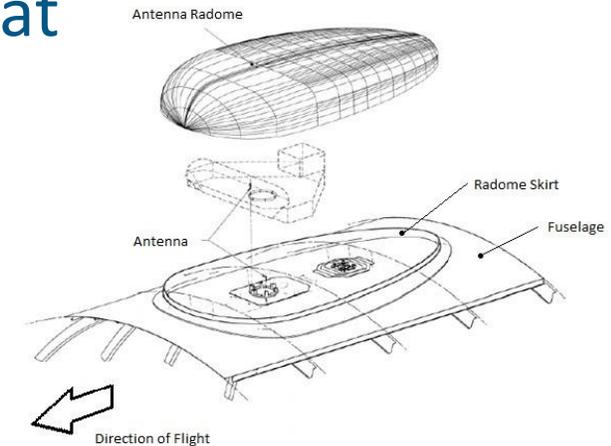
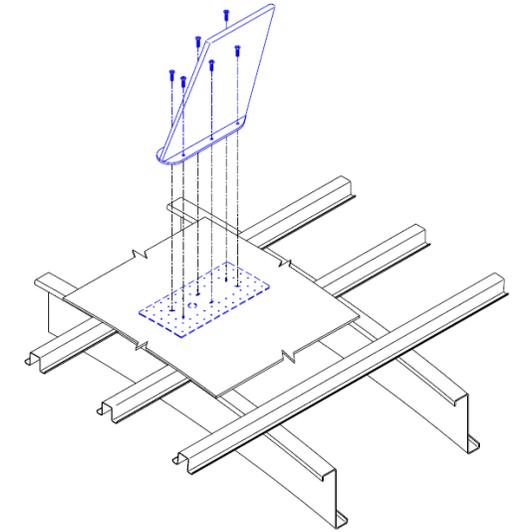


- FAA Policy Statement PS-ANM-25-17 (“Structural Certification Criteria for Antennas, Radomes, and Other External Modifications”).

Specific elaborated Subjects

Classification of Small and Large Antennas

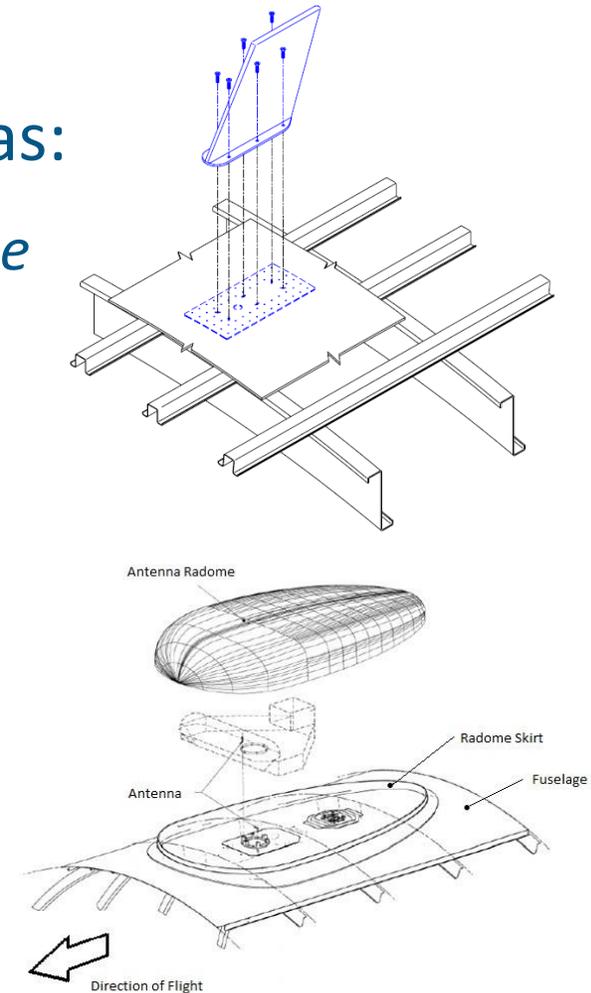
- ▶ Small antenna installations are mainly characterised by their “footprint” being confined between two adjacent fuselage frames and two adjacent stringers.
- ▶ Large antenna installations typically have a “footprint” that spans beyond two adjacent fuselage frames and/or two adjacent stringers
- ▶ Note: typically antenna installations are classified as major, non-significant, but this classification needs to be confirmed for every antenna installation, especially when the size, shape or location are not conventional.
- ▶ Note: Retro-active requirements as contained, for example in 14 CFR Part 26 in the USA, may also apply if foreign authority approval of the antenna installation is applied for.



Specific elaborated Subjects

Fatigue & Damage Tolerance

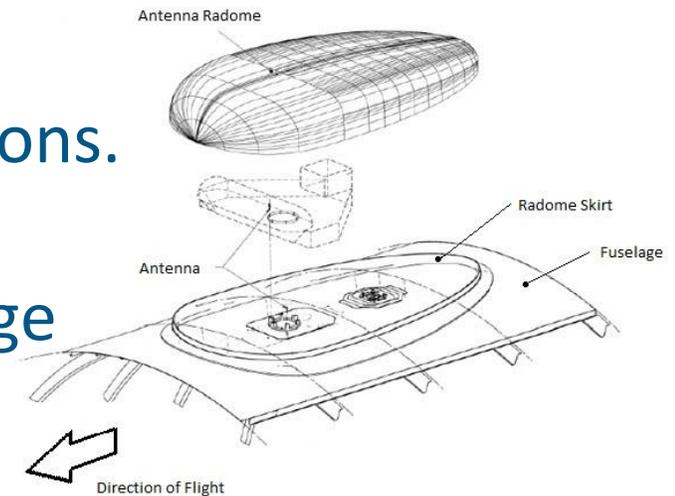
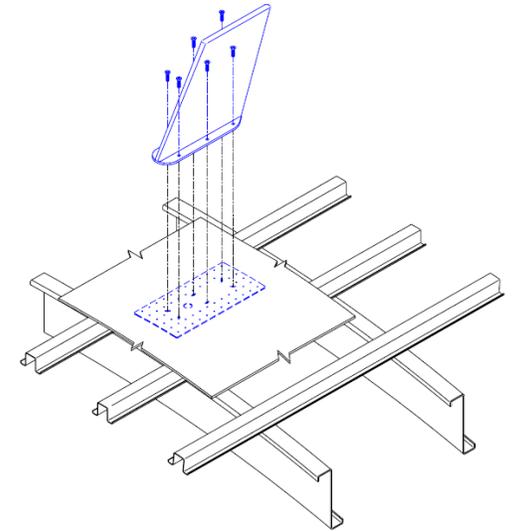
- ▶ Literature to be suggested in most cases for small antennas:
 - ▶ A Chicago (ACO) paper by R. Eastin and J. McGarvey on “*Damage Tolerance Analysis for antenna Installations on Pressurized Transport Airplanes*”
 - ▶ “*DTA guidelines for antenna installations*”, P. Safarian
- ▶ For large antenna installations the above literature alone is not sufficient. In such cases a more elaborated assessment is needed (e.g. fatigue spectrum, crack growth analysis etc.), more guidance elaborated in CM Appendix.



Specific elaborated Subjects

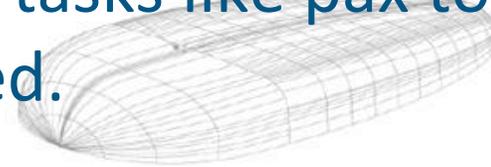
Vibration & Buffeting

- will be covered via a Generic CRI on vibration & buffeting through an ESF (equivalent safety finding). It contains guidance on the use of CFD analysis and the need for additional flight testing.
- Particular attention should be paid to the aerodynamic interference effect between multiple antenna installations. Service experience has shown that this effect can be significant with different combinations of small and large antennas installed.



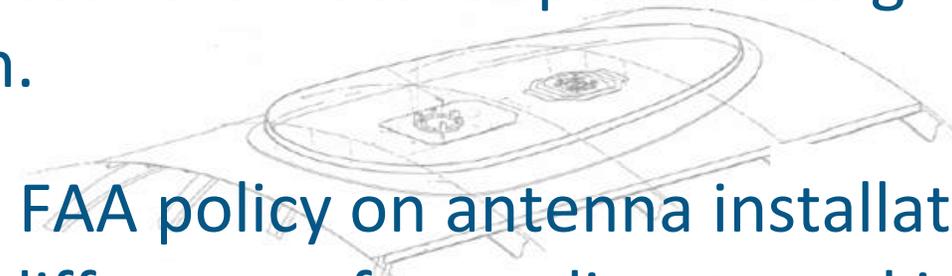
Current Status of the CM

- Due to COVID-19 issues a lot of related tasks like pax to cargo conversion projects had to be prioritized.
- Current regulatory framework on the antenna issue is still the generic CRIs – no lack of requirements.
- Comments from the CRD are hot topic related and took some more effort to be adequately considered within the CM (e.g. F& DT). The publication should still happen in year 2021.



Outlook

- ▶ Possible consideration of extended applicability of the antenna CM to other fuselage or wing mounted pods depending on markets request.
- ▶ Regular update of the CM to account for future specific design concepts requiring additional verification.
- ▶ Continuing harmonization with FAA policy on antenna installations, to have a minimum of regulatory differences for applicants seeking also an FAA approval.





**THANK
YOU**

