Light Aeroplane Design, Certification and Production

Carl Thomas GA Certification Manager
EASA and National systems

National Rules for some aircraft

- State aircraft
  - Military, customs, police, search & rescue, fire fighting, coastguard....
- Annex II
  - Research, experimental or scientific
  - Amateur built (51%)
  - Gyroplanes < 560 kg
  - Very light gliders
  - Certain replicas
  - UAV < 150 kg
  - Microlights
    - BCAR Section A
    - BCAR Section S
CS-23

- Normal, Utility & aerobatic
  - < 9 pax
  - MTOW < 5670 kg
  - Stall speed > 61 kts...

- Commuter
  - Propeller driven
  - 19 pax
  - MTOW < 8618 kg

- Generic CRIs
  - Various standard CRIs
    - Jets / high performance
    - HIRF, Lightning, Lithium battery
CS-VLA

- Single (spark or compression) engine
- Two seats
- MTOW < 750 kg
- Stall speed < 45 kts
- Day VFR
- SC for Night VFR
- SC for 3 seats
- Single non turbine engine
- Two seats
- MTOW 600 kg (650 kg seaplane)
- Stall speed < 45 kts
- Referenced standards
  - Differences in code
  - Variable pitch prop, stall speed, Vne > 108kts..
- 3 RTCs issued
- FAA don’t issue TC for LSA
Two seats
Utility & aerobatic
MTOW 750 kg
MTOW 850 kg for powered & weight / span² < 3 W/m²
Single (spark or compression) engine
SC for electric engine
AMC in Book 2 to the relevant code
FAA AC may be accepted by agreement
- AC 23.1309-1E System Safety Analysis & Assessment
- AC 23.1419-2D Certification of Part 23 Airplanes for Flight in Icing Conditions

Certification Memos
- Mostly for large aeroplanes and helicopters
- Some GA CM in work:
  - Avionics without ETSO
  - Engine and propeller accepted as part of aeroplane RTC
Avionics without ETSO

- LSA Day VFR
- Various criteria to control equipment configuration
- Various criteria calibration & conformity
- Manuals, ICA, software controlled & endorsed by aircraft DO
- Presentation of ASI & ALT OK when:
  - Second independent source of information, or
  - Very clear stall warning & flight characteristics make unsafe conditions improbable
  - AFM/POH gives info on how to detect malfunctions & how to react
- Equipment interface /communicate ATM must be approved
  - Transponder, antenna, altitude encoder, user interface...
Engine and propeller approval

- Engines & propellers are ‘products’
- ‘Shall have a Type Certificate’ Art 5 Reg 216-2008
  - CS-E / CS22 Appendix H / ASTM for Engines
  - CS-P / CS22 Appendix J / ASTM for Propellers
- Restricted Type Certificate CS-LSA
  - Engine & Propeller accepted as part of the aeroplane TC
  - Compliance demonstration by Airframe DOA
  - Airframe POA issue of Form 1 for engine & prop
  - Subcontract control....
  - EASA requested to extend this to sailplanes
FAA Certification Process Study
FAR 23 changes infrequently, inflexible & divisions weight based
Safety Continuum / Risk hierarchy
Objective rules in new FAR / CS 23
MOC in ASTM F44 Standards
  - Rev 0.5 captures FAR 23 Amendment 62 & CS23
  - Rev 1.0 Tier-ing, Safety improving features (LOC & crashworthiness), Differences CS, Canada, Brazil....
  - Available same time as CS23 NPA
EASA ToR for Reorganisation of CS 23, NPA 2015 Q2
European Light Aircraft - definitions

» ELA1
  » Non complex motor powered < 1200 Kg
  » Sailplane or powered sailplane < 1200 Kg
  » ( & some Balloons & Airships)

» ELA2
  » Non complex motor powered < 2000 Kg
  » Sailplane or powered sailplane < 2000 Kg
  » (VLR & some bigger Balloons & Airships )
European Light Aircraft certification basis

• Flexible cert basis
- Anticipates ARC
- FAR23 Amendment 7 Plus Special Conditions
  - Fatigue VLA 572
  - Composites VLA 613, 615, 619
  - Equipment (if glass cockpit)
  - E.g. APM 40 Simba
- VLA Plus SC for equipment
  - Depends on equipment & VFR, night, IFR etc.
Other ELA changes

- **Standard Changes & Repairs**
  - Standard Changes not subject to approval process
  - CS-Standard Changes in work
  - First phase limited to enable consultation

- **Parts without Form 1**
  - Not life limited, primary structure or flight controls
  - Manufactured in conformity with approved design
  - Marked & identified for installation in the specific aircraft
  - Under responsibility of the aircraft owner

- **Changes to requirement for DOA**
Design & Production Approvals

- Alternate Procedures to DOA (APDOA)
  - Optional for ELA1
  - Required for ELA2 (or DOA)
  - Template in AMC

- DOA
  - Optional for ELA1 & 2
  - Template from Per.dahmen@easa.europa.eu

- Cert Plan
  - Required for all type certificates
  - (with extra parts for noDOA)

- POA
  - National application of EASA rules
  - Unless outside EU
Certification Process TC/RTC

- Application
- Phase 0 - Allocation to PCM / First Familiarisation with the applicant / team establishment;
- Phase 1 - Technical Familiarization Type-certification basis;
- Phase 2 - Agreement Certification Programme;
- Phase 3 - Compliance Demonstration;
- Phase 4 - Final Report and issue of TC
1.0 Introduction

2.0 Project Description
2.1 Project History
2.2 Project Definition
2.3 Design Organisation Resources
2.4 Design Subcontractors
2.5 Technologies and Process Descript.

3. Certification Basis
3.1 Certification Basis
3.2 Special Conditions
3.3 Equivalent Level of Safety
3.4 Environmental Protection

4. Certification Process
4.1 Certification Schedule
4.2 Approval of Flight conditions
4.3 Means of Compliance

4.4 Engine/Propeller certification and interactions
4.5 Equipment qualification
4.6 Control of Production and Config.
4.7 Compliance Documentation
4.8 Compliance Checklist
4.9 Master Document List
4.10 Final Declaration of Compliance

5. EASA Involvement
5.1 Initial classification of LOI
5.2 Monitoring and involvement adjust.

6. List of Annexes
   A Type Design Definition
   B Means of Compliance
   C Master Document List
<table>
<thead>
<tr>
<th>Type of Compliance</th>
<th>Means of Compliance</th>
<th>Associated Compliance Documents</th>
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<tbody>
<tr>
<td>Engineering evaluation</td>
<td>MC0:</td>
<td>- Type Design documents</td>
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<tr>
<td></td>
<td>- Compliance statement</td>
<td>- Recorded statements</td>
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<tr>
<td></td>
<td>- Reference to Type Design documents</td>
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<td>- Election of methods, factors</td>
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<tr>
<td></td>
<td>- Definitions</td>
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<td>MC1: Design review</td>
<td>- Descriptions</td>
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<td>- Drawings</td>
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<td>MC2: Calculation/ Analysis</td>
<td>- Substantiation reports</td>
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<td>MC3: Safety assessment</td>
<td>- Safety analysis</td>
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<tr>
<td>Tests</td>
<td>MC4: Laboratory tests</td>
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<td>MC5: Ground tests on related product</td>
<td>- Test programmes</td>
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<td>- Test reports</td>
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<td>MC6: Flight tests</td>
<td>- Test interpretations</td>
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<td>MC8: Simulation</td>
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<td>Inspection</td>
<td>MC7: Design inspection/ audit</td>
<td>- Inspection or audit reports</td>
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<tr>
<td>Equipment qualification</td>
<td>MC9: Equipment qualification</td>
<td>Note: Equipment qualification is a process which may include all</td>
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<td>previous means of compliance.</td>
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<td>MoC Code</td>
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Fees & Charges regulations


Charge for aeroplane TC depends on weight

- Annual fee EU design TC/RTC (pre TC)
  - VLA, Sailplanes €6949.98
  - Up to 2000 kg €13,899.96
  - 2000 to 5,700 kg €262,940.91

- Annual fee EU Design TC/RTC (post TC)
  - VLA, Sailplanes €1042.50
  - Up to 2000 kg €2,316.66
  - 2000 to 5,700 kg €4,633.32
Representatives from the Member States, GA and EASA analysis of the GA sector (January 2012 - September 2012)

Results presented to the EASA Management Board (MB):
- European GA Safety Strategy Discussion Paper; and
- European GA Safety Strategy

European Commission/EASA proposed adoption of the ‘Roadmap for Regulation of GA’ (September 2012 – December 2012)
- Defines the high level scope and timelines for more tailored and proportionate approach to GA
- Action holders are Commission, EASA, Member States and GA community
Based on the level of control over risk and risk tolerance e.g.

1. Uninvolved third parties
2. Fare-paying passengers in commercial air transport (CAT)
3. Involved third parties (e.g. air show spectators, airport ground workers)
4. Aerial work participants / Air crew involved in aviation as workers
5. Passengers (“participants”) on non-commercial flights
6. Private pilots on non-commercial flights

Stakeholders at the top of the risk hierarchy have less ability to assess and control the risk to which they are exposed, and therefore may require more regulatory protection than those at the bottom.
The following initial airworthiness issues to be reviewed:

- Removal of requirement for EASA validation of foreign STCs
- Removal of the requirement of Agency approval of minor modifications
- Publish a definitive and unequivocal list of major modifications
- Publish an AMC authorising the use of FAA AC 43.13-1B as approved data for major and minor repairs
- Publish AMC authorising the use of foreign repair stations which do not have EASA approval
- Publish AMC authorising a licensed engineer to approve the airworthiness of used parts
- Publish AMC authorising the use of FAA procedures for owner-produced parts
- Self-declarative procedure for CS-LSA
Thank you for your attention!

- Please ask any questions
- Technicalquestions@easa.europa.eu