



GENERAL AVIATION (GA) & ELECTRIC PROPULSION

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GA seminar

Your safety is our mission.

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➤ GA & Electric Propulsion

➤ Certified glider

- Lange E1 Antares, certified on 14-Jul-2006
- Lange EA 42 (electric motor), certified under CS-22, Subpart H
- Sportine Aviacija LAK-17B FES, certified on 31-Oct-2014
- FES-LAK-100M (motor accepted as part of the aircraft)

➤ On going certification E-FAN

- Lots of discussions and pre-application meetings
- ASTM F2480(-14), which is in force via CS-LSA



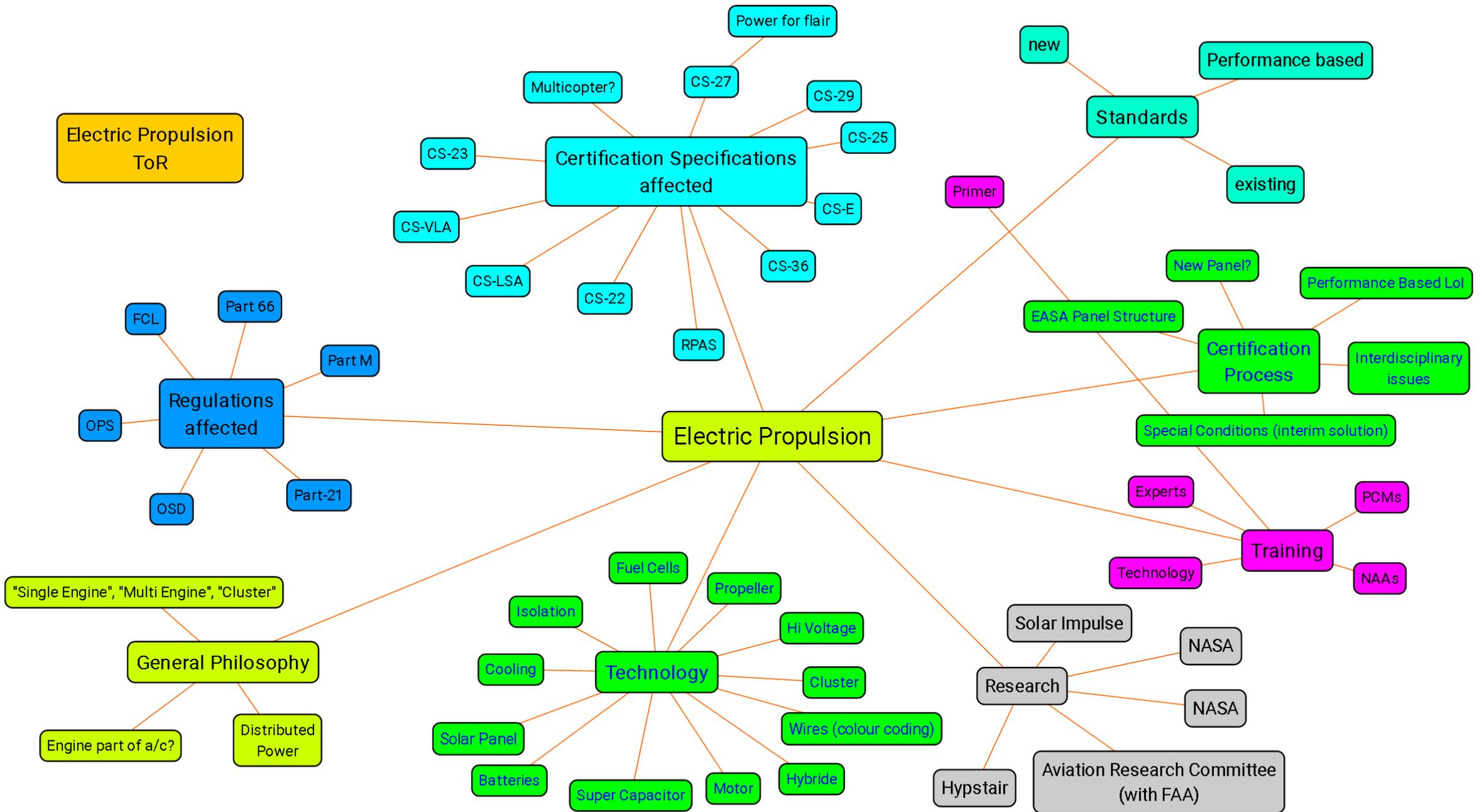
➤ **Outlook:**

- Electric/ hybrid propulsion in GA is clearly developing far further and quicker:
 - Experimental aircraft
 - Microlight
 - Unmanned Aircraft
 - Long term strategy Boeing and Airbus for regional airliner from 2032 onwards
- Allows for a sustainable and environmentally friendly GA
- Promise to be an economical means for different operations
- Synergies automotive and aviation
- Significant amount of research
- There are challenges ahead (e.g. battery technology, controller of motor and battery, energy supply, ...)



➤ EASA's participation

- EASA is highly committed to support electric/ hybrid propulsion
 - Increasing internal expertise and resources
 - Developing adapted specifications, standards, and guidance
 - Intensive coordination with, and support to industry
- Proposed to extend the MTOM of Microlights in Annex II when using electric propulsion however no mutual recognition
- In parallel simplify procedures for certification to CS-LSA which already allows for electric propulsion and with mutual recognition
- New, re-organized Certification Specification CS-23
- Initiated coordination for adaptation of Part 66; OPS and FCL:
 - TOR for comprehensive rulemaking task by end of the year
- Working further (currently) on Special Conditions for CS-23



Electric Propulsion ToR

Regulations affected

Electric Propulsion

Certification Specifications affected

General Philosophy

Technology

Research

Training

Certification Process

Standards

"Single Engine", "Multi Engine", "Cluster"

Engine part of a/c?

Distributed Power

Solar Panel

Batteries

Super Capacitor

Motor

Hybride

Cooling

Isolation

Fuel Cells

Propeller

Hi Voltage

Cluster

Wires colour coding

Solar Impulse

Hypstair

NASA

NASA

Aviation Research Committee with FAA

PCMs

NAAs

Experts

Technology

Special Conditions interim solution

EASA Panel Structure

New Panel?

Performance Based Loi

Interdisciplinary issues

Primer

new

Performance based

existing

Multicopter?

CS-27

CS-29

CS-25

CS-23

CS-VLA

CS-LSA

CS-22

CS-36

CS-E

RPAS

Power for flair

FCL

Part 66

Part M

OPS

OSD

Part-21

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➤ Some thoughts about Electric Propulsion

➤ Rules (examples)

- SEP licence (single engine piston) → which way do we want to go in future?
- B2 → Electric propulsion links electric with powerplant, do we need a separate field?
- 30 / 45 Minutes reserve → indication of available power, discharge completely?

➤ Certification Specifications, technical items

- Software for motor control → how to certify?
- Free running propeller → how to stop an propeller if the engine is out of order
- High voltage → isolation monitoring, fault current sensing, protection (rescue), ...
- High energy batteries having all on board for a fire → to be considered as fire zone?
- Generator runaway for hybrid systems
- Master Switch Arrangement
- Bat shut-off,...

➤ Standards

- What kind of associations or standards are we looking for? (SAE, EUROCAE, ASTM, ...)



Thank you for your attention
Comments and questions are
welcome

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