AEROSPACE SHORT COURSES

Systems and Safety for Electric/Hybrid-Electric Aircraft and Urban Air Mobility - ONLINE (AERO0625)

Instructors: James Lawson

Course Description

Electric and hybrid-electric technologies and autonomy pose a unique set of challenges. Nevertheless, using these technologies, the opportunity exists to create novel fault tolerant and redundant architectures. In this course, students gain practical knowledge of the certification approach afforded by Part 23 Amendment 64 applied to non-traditional aircraft types. Students will consider the application of industry consensus standards for electrical propulsions systems, energy storage systems and sense and avoid. They will recognize different techniques for the creation of safety process artifacts, including Functional Hazard Analysis (FHA), Fault Tree Analysis (FTA), Failure Modes and Effects Analysis (FMEA) and Failure Modes Effects Summary (FMES), and how these might be performed on a complex electric or hybrid-electric aircraft that could incorporate vertical takeoff and landing capabilities. Throughout the course, agile techniques are considered in order that the safety process can guide the design and development of the aircraft.

Who Should Attend?

This course is designed for Part 23 and Part 33 systems/ safety and certification engineers and those involved in the certification of electric and hybrid-electric non-traditional aircraft types. The course assumes a basic understanding of the safety process and certification of a type design aircraft and caters to those wishing to achieve an advanced understanding of how the processes might be adapted to non-traditional aircraft types.

Learning Objectives

- Knowledge to be able to adapt the safety process for non-traditional aircraft types and technologies
- Challenges/opportunities afforded by electric and hybrid-electric architectures
- Challenges/opportunities afforded by a self-piloted aircraft with a sense and avoid capability
- An understanding of different techniques for the creation of safety process artifacts such as FHA, FTA, FMEA/FMES and model-based systems/safety engineering
- Knowledge of how to integrate the artifacts of the safety process.

Course Outline

- Introductions/ ice-breaker exercise
- Introduction to certification
- Certification basis development
- Means of compliance development
- Introduction to the systems/ safety process
- FHA/ FMEA/ FMES/ reliability prediction
- Electrical Propulsion System Example
- Energy Storage System Example
- Urban Air Mobility Aircraft Example
- Electric/ Hybrid Electric Aircraft Example
- Integration of model-based approaches and safety
- Alternative approaches such as STPA
- STPA examples
- Detect and Avoid Systems and Autonomous Aircraft
- Application of RTCA DO-178C
- Software Challenges
- Application of RTCA DO-254
- Complex Hardware Challenges
- Leveraging COTS complex hardware from other industries
- Deterministic Network Switching

Classroom hours / CEUs

21.00 classroom hours
2.1 CEUs

Certificate Track

This course is not part of a certificate track.

Course Fees

Early registration course fee: $1,795 if you register and pay by the early registration deadline (45 days out).

Regular registration course fee: $1,895 if you register and pay after the early registration deadline.

U.S. Federal Employee Discount

This course is available to U.S. federal employees at 10% off the registration fee. To receive the federal employee discount, you must enter the code **FGVT116** during the checkout process. Please note that you must validate your eligibility to receive this discount by entering your U.S. government email address (ending in .gov or .mil) when creating your online registration profile. This discount is available for both the early registration and regular registration fees.

Instructor Bio

James Lawson is a systems and safety engineer with expertise in the certification of software and complex hardware. He is a FAA Designated Engineering Representative (DER), Parts 23, 27, 25 and 29 Systems and Equipment delegation. He has led and managed teams of engineers in defining system architectures, the integration, validation and verification of flight critical systems and the safety assessment of two braking systems, an engine protection and monitoring system and several electrical power systems. He was the lead systems engineer for the design of the Lockheed Martin F-35B auto-escape system and the redesign of the Boeing 787 electronic braking system. He serves as a consultant in systems and safety. He has intimate knowledge of the Urban Air Mobility (UAM) space, having guided three leading electric Vertical Takeoff and Landing (VTOL) companies, along with several others working on electric/ hybrid-electric aircraft technology, detect and avoid systems and hydrogen fuel cells. He is an instrument rated private pilot with a MEng, Systems Engineering from Loughborough University, UK and a CEng from the Institution of Engineering and Technology (IET).

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