

AEROSPACE

SHORT COURSES

High Intensity Radiated Fields (HIRF) Certification and Compliance (AERO0381)

Instructors: C. Bruce Stephens, Darren L. Stout, Tae Yoon *(This course may be taught by either instructor.)*

Course Description

This course will discuss the design concepts required to ensure all aspects of aircraft HIRF electrical wiring, installations, and aircraft-level systems are safe for operation. This course will discuss the typical certification process for HIRF from a very practical, step-by-step perspective and examine all steps used by aircraft OEMs to show compliance to HIRF regulations. The 14 CFR 25.1317 for transport category airplanes will be used as the baseline regulation. A review of FAA Advisory Circulars and practical applications of the information will be presented, and teams will be selected to simulate the HIRF certification process. HIRF requirements for aircraft maintenance and inspection will also be discussed. The course will also include a high-level overview for electromagnetic effects areas; topics discussed include electromagnetic compatibility (EMC), precipitation static (P-static), lightning, ESD and electrical bonding requirements. An overview of the new requirements for electrical wiring interconnection system (EWIS) will also be addressed.

Students will work in teams to gain hands-on experience building a project incorporating the information they learn as they progress through the course.

Learning Objectives

- Understanding of the HIRF CFR related to aircraft protection
- How HIRF requirements relate to the different areas of the aircraft
- HIRF bench testing and aircraft level testing requirements
- Safety aspects of HIRF
- Design requirements related to HIRF
- How HIRF relates to other engineering requirements
- Showing and finding compliance for HIRF

Who Should Attend?

The course is designed for all aircraft design areas including electrical and avionics, along with HIRF engineers, laboratory and aircraft technicians. Aircraft managers and project engineers working in electrical/avionics related areas should also attend.

Course Highlights

- HIRF best practices
- Team HIRF workshops
- DER/UM HIRF requirements
- HIRF examples and practical applications
- Review of the HIRF Advisory Circulars

Course Outline

Day One

- Introduction, HIRF overview and history
- The electromagnetic environment of aircraft—metallic and composite aircraft requirements
- Electrical Bonding Electromagnetic Effects Overview
- Advisory Circular 25.899-1 Electrical Bonding and Protection Against Static Electricity (P-Static)
- Electrical Wiring Interconnect System (EWIS)
- HIRF security and safety

Day Two

- FAA DER/UM HIRF requirements
- Certification of HIRF systems on transport category airplanes
- Supplier requirements documents
- HIRF component classification
- Radio frequency susceptibility, RTCA DO-160 Section 20 test requirements
- Advisory Circular 20-164A
- Test witnessing requirements
- HIRF compliance statements and reports
- Transmitting Portable Electronic Devices (T-PEDs)

Day Three

- HIRF certification case study design example
- Means of compliance
- QTPs, QTR's, analysis, and use of similarity
- HIRF examples and practical applications
- HIRF integrated system test rig

Day Four

- FAE ARP 5583 for HIRF aircraft testing
- Comparing aircraft data to bench test data
- Testing examples and case studies
- L/HIRF maintenance

Day Five

- CFR compliance statements
- Final EWIS discussion and questions

- EWIS final exam presentations

Classroom hours / CEUs

31.50 classroom hours

3.15 CEUs

Certificate Track

Aircraft Maintenance and Safety

Avionics and Avionic Component

Electromagnetic Effects

Course Fees

Early registration course fee: \$2,595 if you register and pay by the early registration deadline (45 days out).

Regular registration course fee: \$2,795 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 Bios

C. Bruce Stephens is an FAA DER/EUM in the areas of EME, HIRF, Lightning, Fuel Systems, Structures and EWIS. His aircraft certification experience includes Beechcraft Starship, King Air, Bonanza, Baron, Hawker 4000, Hawker 800XP, Premier 1, JPATS, Learjet Model 45/75, Cessna Citation Latitude, and military projects related to Boeing 707, 737, 747, 767 KC-46A Tanker, and 777. Stephens continues to work on Part 27 and 29 rotorcrafts (MH139 Grey Wolf), and space vehicle certification projects. He has assisted several smaller companies with FAA EME certification projects and is interested in the certification requirements related to new EVTOL Aircraft. Stephens enjoys mentoring new FAA delegates and instructing several courses he has developed for The University of Kansas Aerospace Short Course program. These courses include HIRF, Lightning, EWIS, EZAP, DO-160, Fuel Systems, Introduction to EME, and EME Aircraft Testing/Certification. Stephens has been a Six-Sigma/Lean Master Black Belt consultant with experience in both aircraft and copper mining process improvement. He has instructed over 25 college courses, most being MBA level, including MBA Statistics, MBA Business Management, MBA Operations Management, MBA Six Sigma/Lean Production Management, Supply Chain Management, Six Sigma/Lean Black Belt and Green Belt. Universities Stephens has instructed at include Webster University, Friends University, Embry Riddle University, Southwestern College, Newman University and The University of Phoenix. He has an executive M.B.A. and M.S. in

Management from Friends University and a B.S. in Industrial Technology from Wichita State University.

Darren Stout is an EME/HIRF/Lightning ODA UM/AR at the Boeing Company. Darren has a wealth of experience in Electromagnetic Effects (EME), High Intensity Radiated Fields (HIRF), lightning effects, p-static effects, and transmitting personal electronic devices, RTCA/DO-160, MIL-STD-461, along with extensive experience in laboratory and aircraft testing. His experience is a result of over 22 combined years as an Electrical and EME engineer with Boeing, Lucent Technologies (Bell Labs), FAA, and BancTec. He also served six years in the United States Air Force as a B-52 navigator, instructor navigator, and radar navigator (bombardier), directing and performing higher headquarters missions including aircraft, systems, and munitions testing, and is a Desert Storm veteran. He has a BSEE degree in electrical engineering (lasers, fiber optics, and antenna arrays) from the University of Michigan - Ann Arbor, is an iNARTE certified EMC Engineer, and is a Level 2 Certified TEMPEST Professional.

Tae Yoon is an Electrical Systems and Equipment FAA DER with authorization in Electrical Systems, HIRF/Lightning, and EWIS. Yoon has 24 years of experience in aircraft design, development, manufacturing, certification, and field service with prior work experience at Boeing, Honda Aircraft, Northrop Grumman, and Sikorsky Aircraft. Over his career, he gained experience in all phases of aircraft and systems development and certification projects, ranging from early concept design to development, certification, and post- certification field service engineering. In addition to his experience as an FAA Systems and Equipment DER and Technical Manager, Yoon has also worked in factory floor/laboratory settings as a design and MRB support engineer/lab test engineer early in his career. He has designed and managed requirements on Electrical Wiring Interconnect Systems, electrical power systems, lithium-ion battery systems, electrical bonding and grounding of systems in composite and aluminum airframe from an early concept stage, and developed, validated, and verified various aircraft systems and electromagnetic engineering requirements. As for Yoon's other endeavors, he works as a certification and engineering consultant in the electric aviation industry and teaches aircraft system safety (per ARP4761) and systems engineering (ARP4754) courses. He has a passion for teaching and mentoring young engineers in the aviation field. Yoon graduated from Cornell University with a Bachelor of Science degree in mechanical and aerospace engineering on the dean's list.

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