



Request for Proposal
The Role of Human Factors in Flight Deck Design and Certification Process
An Introductory Guide for Engineers, Managers, and Pilots

1. RTCA Background

RTCA, Inc. offers a variety of training courses to facilitate the use of key documents by stakeholders, and to enhance the understanding of developing and using global standards and guidance. As a non-profit organization, RTCA provides leadership to assist the aviation community in implementing the new standards developed with by our special committees.

As the aviation regulatory certification process continues to evolve, RTCA has teamed up with recognized human factors experts from industry, government, and academia to collaboratively develop a new training curriculum in human factors. The science of human factors engineering (HFE) consists of a broad body of both knowledge and processes, including a professional group of scientists and engineers from multiple disciplines. Consequently, there are many academic training programs in HFE available at the bachelor's, master's, and doctoral degree levels. This RTCA course is designed to complement that academic knowledge base and provide a practical, applied perspective tailored to role of the human factors discipline in the design and certification of aircraft flight decks. The goal of this course is to provide an overview of the role, value, scope, and unique contributions human factors professionals bring to the design process such as research, regulatory requirements, flight deck design, evaluation, certification, etc. The course is aimed at managers and engineers with little or no background in life/social sciences. It is not intended to train the methods of human factors but rather to provide sufficient knowledge and awareness of those methods to enable engineers and managers to determine where human factors apply in the design process and associated human factors roles.

2. RTCA Standards Overview/Training Courses

RTCA's Special Committees leverage the expertise of the aviation community to generate recommendations in response to requests from the FAA to address technical topics. The RTCA Special Committees develop performance standards, reports and guidance material that help shape the certification of the safety and efficiency of new equipment and technologies. RTCA standards are frequently invoked by the FAA in Technical Standard Orders and Advisory Circulars and, therefore, provide a partial basis for certification of equipment and systems.

RTCA guidance materials are intended for use by aircraft manufacturers and suppliers of electronic hardware and software of airborne systems. They are applicable to current, new and emerging technologies.

Currently, RTCA offers training courses on the standards and recommended practices such as:

- RTCA DO-160, *Environmental Conditions and Test Procedures for Airborne Equipment*
- RTCA DO-178C, *Software Considerations in Airborne Systems and Equipment Certification*



- Supplements to DO-178C
- RTCA DO-254, *Design Assurance Guidance for Airborne Electronic Hardware*
- Airworthiness Security Certification Course

These courses are designed to enhance the understanding of the guidance documents and are taught by knowledgeable, industry practitioners with expertise in the covered areas.

RTCA is expanding its training course catalog to include courses of added value to the aviation community.

3. Description of Services

While the purpose of this course is not intended to develop human factors specialists, it should be designed to provide a practical application of HFE for a broad scope of personnel involved in the management, engineering, and operations of aircraft. This could include:

- Managers
 - Project/program managers
 - Technical project managers
- Engineers involved in flight deck design and certification.
 - Mechanical engineers
 - Electrical engineers
 - Avionics engineers
 - Safety engineers
 - System engineers
 - Software engineers
 - Certification specialists
 - Others on the design/development/certification team
- Newly hired human factors specialists, engineers or managers who will be teamed with seasoned human factors specialists in their work
- Flight Test Engineers
- Flight Operations
 - Test Pilots
 - Demo/Line Pilots
- Flight crew, dispatchers, cabin crew, and air traffic controllers



The purpose of the RTCA The Role of Human Factors in Flight Deck Design and Certification Process course is to provide students of the course the following:

- An overview of how civil flight decks are designed, evaluated and certified
- How HFE contributes to safe and desirable flight deck design
- An introduction to the tasks and responsibilities of flight deck human factors engineers to non-human factors engineers
- A review of the physical, physiological, psychological, and cognitive performance capabilities of flight crews
- An understanding of the limitations of flight crew's performance, how it is impacted by systemic variables in the flight deck environment and impact crew workload and human error

4. Requested Services

RTCA is soliciting proposals from qualified training providers (RTCA member companies, non-member companies or individuals) who have the capacity to develop and deliver HFE training course(s). Successful respondents shall possess required knowledge and practical understanding of the Human Factors field and have experience with developing and conducting training courses.

- **Course Length:** A three-day (preferred) course will be a practical introduction and applications of the human factors discipline.
- **Course Objectives and Key Themes:**
 - The overall objective of The Role of Human Factors in Flight Deck Design and Certification Process course is for students to develop an appreciation for the science behind HFE and how it goes beyond collecting opinions and anecdotes from users of flight decks. The scientific methods range from the physical aspects of how humans perform, such as biomechanics and occupational physiology, through individual cognitive and perceptual abilities to human social interactions in flight operations. An objective approach from these scientific methods will be presented where appropriate.
 - Specifically, the objective of this course is to provide:
 - A basic understanding of HFE
 - Understand HFE terminology
 - Recognize human factors issues, specifically in the flight deck
 - An overview of HFE analysis
 - An overview of HFE design methods
 - How best to apply a user-centered design
 - An overview of HFE test and evaluation methods
 - When and how to do HFE testing
 - An introduction to HFE aspects for flight deck certification
 - Recognize HFE relevant regulations (focus on FAA and EASA CS-25)
 - How to show and document compliance



- **Key themes that will be presented in this course include the following:**
 - What is HFE and why it is important
 - The importance of organizational support for embedding HFE into engineering processes
 - The role of flight deck HFE and the elements they must consider
 - The role of HFE in flight deck design and certification including typical engineering activities and artifacts that result in a human-centered design
 - Identifying the touch points that determine when a human factors specialist support is required
 - Highlights of the infrastructure and tools that typically support HFE such as prototyping tools, part-task simulators, benches, mock-ups, etc.
 - Understanding the different kinds of HFE expertise i.e., hardware, software, process, analysis, cognitive, operations etc. and how the disciplines support each other
 - Why engineers may think HFE is common sense and how to address that flawed perspective
 - Highlights of the importance of data-driven design that is focused on meeting the needs of the end user
 - Understanding of the basics of human performance and design processes that support it
 - Identification of resources for further information and learning

- **Course Content (building blocks):**
 - Historical Context: Evolution of flight deck systems: accidents/incidents (positive as well as negative) relating to human performance and flight deck design.
 - The Value of HFE: the basic concept is that to fit two parts of any system together effectively requires detailed knowledge of how each part functions. This is how we design an effective interface between a human and an aircraft.
 - How Humans Perform: flight crew capabilities and limitations. The concept of limiting subsystems, that users (e.g., pilots) can only perform as well as that part of their ability set that is limiting in a particular situation.
 - Human Factors Fundamentals: physical performance, human control of systems, sensing, perception, decision making, human-human interactions on the flight deck.
 - Human Factors Program Planning.
 - What human factors brings to analysis activities, e.g. task analysis, and what human factors brings to test activities, e.g., workload measures, usability, failure recovery, human factors evaluation reports.
 - Design Methods: human centered design activities, roles of human and automation.
 - Setting the Scene: understanding your end user and operational mission.
 - Human factors certification activities and typical artifacts, e.g., human factors certification plan, how human factors integrates with the timeline of certification Human Factors Standards, Certification Guidance and Regulations in Flight Deck Design:
 - 1301 (discussion about intended function, how to formulate a problem statement and derive initial requirements)



- 1302 (discussion focused on systems used by the flight crew, human performance, usability, and human error)
- 1309 (discussion focused on workload during failure conditions and recovery)
- 1322 (discussion focused on flight crew alerting, attention getting, and use of colors)
- 1523 (discussion focused on workload during normal operations and establishing a minimum crew)

Other relevant information:

- Course could either be developed by an outside vendor for ownership by RTCA or developed by outside vendor and provided on a contractual basis by course offering.
- RTCA anticipates offering the course for at a minimum of 1 time (preferably 2 times) during 2021 and then at a higher rate 2022 and beyond.
- Class size will be approximately 20 students.
- The training will take place at RTCA headquarters in Washington, DC or at an RTCA designated facility in the US or other countries.
- The course should also be designed for possible online offerings.
- RTCA would also consider the option of on-site training upon request.
- High quality expected, with RTCA stamp.

5. Role of RTCA

- Marketing and promotion of training course.
- Course registration and management.
- Provision of course facilities, course materials (including manuals and associated documents), audio visual equipment and associated logistics.
- Support for course attendees.
- Technical advisor for course development and on-going review and analysis.
- Course development will be monitored by the RTCA HFE Course Steering Committee.
- The RTCA HFE Course Steering Committee will continue course monitoring after implementation to include reviewing feedback from students for possible course adjustments.

6. Vendor Selection

In preparing submissions, respondents shall, at minimum provide an answer to the questions/statements included below.



Questions
The proposal should include a brief history of the company or individual, its size, and its experience with training development for technical standards. Include background & experience (resume/CV) of individuals expected to develop the course.
Please explain why you are interested in developing the RTCA Role of Human Factors in Flight Deck Design and Certification Process Training Course.
What is your experience with human factors in the design and certification of flight deck systems?
Do you offer other Training Courses (RTCA standards or others)?
What is your knowledge of the RTCA standards, FAA regulations (TSO, AC, etc), certification process (FAA/EASA)?
Please provide us with system/equipment example development you work/worked on and the accomplishment, full development process up to the equipment certification.
Please submit a detailed timeline for course development.
Please identify potential trainers to provide the training services. Please include their resume/background information.
What is the cost for developing the training course? Please include a detailed budget.
What is the cost for providing the training?
Please include plans to access any specific intellectual property and/or anticipated development of IP in the proposal and its preferred handling (ownership, open access, access terms, etc.).
Other information you would like to provide.

7. Selection Criteria

Selection of the successful offeror(s) will be based on:

- Relevant experience, competency, HFE credibility in flightdeck design and certification and past performance
- Training course development synopsis and detail
- Capacity to provide service to develop and conduct the training
- Experience of instructor(s)
- Cost of development
- Cost and sustainability of conducting training course(s)
- Ability to initially offer at least one class in 2021 (preferably two) and as many as 4 per year beyond



- Cost proposal
- RTCA members preferred

All proposals received on or before March 16, 2021 will be reviewed. Incomplete proposals or proposals that fail to follow the submission guidelines will not be considered for review. RTCA reserves the right not to award any contract under this RFP.

8. Milestones

RFP Release: February 16, 2021

Deadline for Questions: March 2, 2021

Proposals Due: March 16, 2021

RTCA decision on Human Factors Course: April 2021

First Training Class: 3Q2021

Submit proposal for consideration on or before March 16, 2021 to:

Brett Eastham

RTCA, Inc.

1150 18th St NW, Suite 910

Washington DC 20036

Or email to beastham@rtca.org

Questions and requests for additional information may be directed to Brett Eastham at the above email address.