

AEROSPACE

SHORT COURSES

Human Factors Engineering in Civil Flight Deck Design and Certification (AERO0690)

Instructors: Gernot Konrad, Clark Badie (This course may be taught by either instructor.)

Course Description

The goal of human factors engineering in civil flight deck design is to ensure that the pilot compartment and its installed systems and equipment support safe aircraft operation and comply with applicable certification regulations, are easy to use, maximize human-machine performance, and provide a superior pilot experience. Flight deck human factors engineers work to support a pilot-centered flight deck development process. They generate requirements by applying data-driven knowledge about the pilot's capabilities and limitations and validate them through analysis and structured evaluations/tests. This course is intended to give engineers, pilots, and managers involved in the design and certification of civil flight decks an introduction to the required human factors engineering activities. The course reviews the physical, physiological, psychological, and cognitive performance capabilities of flight crews. It explores the limitations of pilots' performance and how they are impacted by systemic variables in the flight deck environment. It then examines how pilots' capabilities and limitations impact crew workload and human error. The course builds a theoretical human factors engineering foundation for designing and assessing civil flight decks and their installed systems and equipment. The course provides flight deck design examples and accident analysis from a human factors point of view. Key topics include applicable certification regulations, design guidelines, industry standards, and means of compliance.

Who Should Attend?

This course is intended for engineers/scientists, pilots, and managers at aircraft manufacturers, system/equipment suppliers, regulators, accident investigation bodies, and research/teaching facilities involved in the design, evaluation/test, and/or certification of flight decks for civil aircraft.

Learning Objectives

- Problems: Overview of Flight Deck HF focus areas and potential HF issues
- Science: Concepts and theoretical models to understand human factors and flight crew performance
- Execution: Processes (methods and procedures) for design, analysis, and evaluation/test and data collection methods
- Regulations: Applicable certification regulations for Part 25 aircraft and examples on how to show compliance

- Guidelines: Regulatory guidelines and useful industry standards
- Examples: Best (and worst) examples of HFE application in design
- Literature: Useful literature

Course Outline

Day 1

- Lecture 1 Introduction to Human Factors Engineering
- Lecture 2 History of Human Factors and Evolution of the Flight Deck
- Lecture 3 Responsibilities of Flight Deck Human Factors Engineering
- Lecture 4 Flight Crew Physical Capabilities and Limitations
- Lecture 5 Flight Crew Physiological Capabilities and Limitations

Day 2

- Lecture 6 Flight Crew Psychological Capabilities and Limitations
- Lecture 7 Flight Crew Cognitive Capabilities and Limitations
- Lecture 8 Situation Complexity and Automation
- Lecture 9 Flight Crew Alerting

Day 3

- Lecture 10 Handling Qualities
- Lecture 11 Human Performance and Workload
- Lecture 12 Human Error

Day 4

- Lecture 13 Situation Awareness and Decision Making
- Lecture 14 Usability and User-Centered Design

Day 5

- Lecture 15 Experiment Design and Data Analysis
- Lecture 16 Human Factors Planning and Execution

Classroom hours / CEUs

35.00 classroom hours

3.5 CEUs

Certificate Track

This course is not part of a certificate track.

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.

Canada Department of National Defence Discount

This course is available to Canada DND employees at 10% off the registration fee. Please contact the DND Procurement Authority (DAP 2-3) for details. Please note that you cannot register using our online system when requesting this discount. This discount is available for both the early registration and regular registration fees.

Instructor Bios

Dr. Gernot Konrad is an aerospace engineer with extensive avionics and pilot vehicle interface experience, demonstrated through over twenty years of designing and certifying highly integrated flight decks with complex systems for small and large aircraft. This includes over ten years of technical leadership, applying diverse skills for Agile technology development, and coordinating collaborative multi-level and multi-disciplinary teams. He holds an advanced degree (Dipl.-Ing) and a doctorate (Dr.-Ing) in Aerospace Engineering from the University of Stuttgart. He is qualified as an engineer (Ing.) in aeronautics by the Austrian Federal Economic Chamber (WIFO). Throughout his career, he was involved in recruiting and training flight deck Human Factors (HF) practitioners. Today, Dr. Konrad is the Chief Engineer for HF at Honeywell Aerospace Technologies, where he provides HF leadership and vision across multiple program platforms spanning current and future systems for the air transport, regional, business, general aviation, helicopter, and urban air mobility markets. Dr. Konrad is also the chairman of the EASA HF Collaborative Analysis Flight Deck Design and Certification Group, a member of the GAMA Flight Deck HF Working Group, was a member of the RTCA HF Training Steering Committee, and provides an annual seminar on Human Factors Engineering in Flight Deck Design at the University of Stuttgart. Prior positions include Fellow for HF at Honeywell Aerospace Technologies, HF Engineering Group Head at Gulfstream Aerospace, Avionics and HF Engineer at Pilatus Aircraft, Research Associate at the Institute of Aircraft Systems at the University of Stuttgart, and freelance theoretical knowledge instructor at Lufthansa Flight Training and Swiss Aviation Training.

Clark is a recently retired aerospace engineer, with 40 years of avionics systems, certification, and human factors experience, including project leadership for large scale development and

certification programs and technical leadership over various teams of flight deck systems, software, and human factors engineers. He was involved in all aspects of avionics development and certification including requirements development, certification, flight deck design, human factors, software development, flight test, and environmental evaluations. Clark was selected to lead a new organization focused on Human Factors development and certification activities across Aerospace, where he assembled a team of experts, deployed a Human Factors development and certification compliance process, and led the application of multiple development programs. Clark graduated with a Bachelor of Engineering, with a major in electrical engineering, at the Stevens Institute of Technology, in Hoboken, New Jersey. He later received a Master of Business Administration at Arizona State University, in Phoenix, Arizona, and spent several years in a product marketing manager role. Clark was and remains active in the aviation industry. For nearly 20 years, he was the Chairperson for the Avionics Harmonization Working Group, which consisted of global regulatory and industry experts that developing new and modified joint Federal - European regulations and advisory material for avionics and flight deck displays. He is currently the vice chair for the SAE G-10H Human Factors group, who are responsible for publishing industry standards including Aerospace Recommended Practices (ARPs) for Human Factors development and certification.

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CONTACT US:

KU Jayhawk Global
Aerospace Short Course Program
1515 St. Andrews Dr.
Lawrence, KS 66047
Email: jayhawkglobal@ku.edu
Phone: 785-864-6779 (Registration)