

SHORT COURSE

Flight Control Actuation System Considerations on Architecture Design and System Installation

By Dominique van den Bossche

Wednesday, Nov 16, 2016

9:00 - 13:00 DIMEAS meeting room 3rd floor

The purpose of this four hour short course is to provide information to understand how the basic architecture of a Flight Control Actuation System of a transport airplane is established, i.e. understanding the rationale for the distribution of the control surfaces, power sources, actuators and computers.

Learning Objectives

By attending this seminar, you will be able to:

- Understand the Flight Control Actuation System main requirements
- Identify technical alternatives covering various aspects of Flight Control Actuation System architecture
- Identify the impact of some installation constraints on Control Actuation System architecture
- Describe various examples of Flight Control Actuation System architectures

Who Should Attend

This seminar is designed for academics, engineers, executives, and other key personnel with an interest in flight control knowledge or experience.

Prerequisites

None

Topical Outline

- **Actuation system architecture driving requirements**
 - Certification
 - Particular Risks
 - MMEL requirements
 - Margin on failure probabilities
 - Arbitrary failure conditions to be covered
 - Dissimilarity
- **Actuation system architecture design considerations**
 - How many control surfaces?
 - Balanced vs unbalanced surfaces
 - Mechanical vs powered system
 - How many power sources?
 - Electric vs hydraulic power sources
 - How many actuators per surface?
 - Active/active vs active/std-by & double activation
 - EMA vs EHA
 - EBHA vs EHA
 - How many computers?
 - Centralized vs distributed electronics
 - COM/MON vs triplex voting
 - Dissimilarity (electronics, power sources, back-up system)
 - Back-up system

- **Pilot controls**
 - Side stick vs control column
 - Active vs passive side stick
- **Considerations on system installation**
 - UERF and System Routing
 - Bird strike and segregation
 - Electric actuator thermal management
 - Fire prevention
 - Lightning Strike
 - Actuator installation configurations
- **Actuation system architecture examples**
 - System architecture analysis principle
 - Architecture examples

Instructor: *Dominique van den Bossche*

Dominique van den Bossche is currently an independent consultant, mainly working for European and US Flight Control Actuation companies / organizations, after 38 years of development activities at Airbus. He is a graduate of the French “Ecole Nationale Supérieure d’Ingénieurs de Constructions Aéronautiques”.

He was formerly appointed as Head of Department, in charge of the Primary Flight Control Actuation & Hydraulics, covering research and development of the Primary Flight Control Actuation, Cockpit Controls, Hydraulic Systems, for all Airbus models from A300B to A380, A400M and A350.

In addition, as an Airbus Senior Expert, he was involved in the technical support of Airbus Group Flight Control Actuation activities, occasionally assigned as a consultant to support external projects dealing with these technologies.

He has been delivering Flight Control Actuation Systems lectures at the Institut Universitaire de Technologie (IUT), at the Institut National des Sciences Appliquées (INSA) and at the Ecole Nationale de l’Aviation Civile (ENAC) in Toulouse, France, as well as at many French, European, Canadian, US, Brazilian and Japanese companies / organizations.

He is currently serving the SAE-A6 Committee, Fluid Power, Actuation & Control Technology as the committee Vice-Chairman.

He holds 4 patents involving flight control actuation equipment design and application.

He has been presented an award by the French Academy of Technology for his achievements on electrohydraulic actuation (EHA) technology.