



SAE A-6 AEROSPACE ACTUATION, CONTROL AND FLUID POWER SYSTEMS COMMITTEE MEETING

Descriptions and Schedules of Short Courses

October 20-23, 2014
Hyatt Regency Santa Barbara
1111 East Cabrillo Boulevard
Santa Barbara, CA 93103

Aerospace Hydraulic Components

Instructor: Jeffrey C. Dickey

Course ID#: C1421

Sunday, Oct. 19, 2014: 1:30 pm-5:30pm

Overview

SAE International is pleased to offer this professional development seminar in conjunction with the SAE A-6 Aerospace Actuation, Control and Fluid Power Systems Committee meeting Oct. 20-23 Santa Barbara, CA.

This 4 hour short course will provide an overview of the hydraulic components used on aircraft. There will be a brief overview of hydraulics, aircraft hydraulic systems, and aircraft flight controls. You will learn the function of each component used within the hydraulic system, and then look in depth at each component's design.

Objectives

By attending this seminar, you will be able to:

- Explain how a hydraulic system is used in an aircraft
- Identify the various components used in a hydraulic system
- Explain the functions of hydraulic components
- Identify the design styles of hydraulic components
- Explain the strengths and weaknesses of hydraulic components

Target Audience

This seminar is designed for those with mechanical aptitude interested in the design and usage of components within an aerospace hydraulic system. No previous knowledge or experience is needed.

Topics Covered

- General
 - A History of Hydraulics
 - Hydraulics in Aircraft Systems
- The Aerospace Hydraulic System
 - Principles
 - System Architecture
 - Hydraulic Actuation
 - Hydraulic Issues (Contamination, Air, Cavitation)
- Hydraulic Power Sources
 - Pumps, Accumulators, RAT
 - Theory of Operation
 - Designs
- Components: Function, Principal of Operation, Design Types, Strengths / Weaknesses, Usage Examples, and Specification Requirements.
 - Filtration
 - Restrictors
 - Check Valves
 - Relief Valves
 - One Way Restrictors
 - Pressure Regulating Valves
 - Thermal Relief Valves
 - Valves: Selector, Solenoid, and Shuttle
- Future Trends
 - Power Sources (EHA, EBHA)

Instructor: Jeffrey C. Dickey

Jeffrey C. Dickey is Executive Vice President – Hydraulics for The Lee Company, a manufacturer of high precision miniature hydraulics components used in the aerospace, medical, and industrial industries. He is responsible for seven business units, overseeing both engineering and manufacturing. Mr. Dickey has been designing hydraulic components for the past 32 years, starting as a project engineer and working his way up to his current position. He has designed and developed an array of proprietary hydraulic component designs for plugs, restrictors, check valves, pressure relief valves, flow regulating valves, pressure regulating valves, pilot operated valves, shuttle valves, bypass valves, solenoid valves, etc. His designs have helped solve issues within hydraulic systems for aerospace, medical implants, military vehicles, missiles, satellites, submarines, down-hole oil tools, formula 1 race cars, etc. He has Patents on a High-Pressure Pin Plug (Patent 4867333) and Expansion Sealing Device (Patent 5121947). He is an active member of the SAE – A6 Fluid Power, Actuation and Control Technology Committee. He is currently the Panel Chairman of the A6C5 Components Panel, and Co-Author of SAE Paper 912134 “Total Flexibility in Cartridge Valve Porting Through Innovative Sealing Technology” Mr. Dickey received his B.S. in Mechanical Engineering from the University of Connecticut.

Registration Fee: \$295

CEUs: .4

Power Electronics for Mechanical Engineers

Instructor: Michel Todeschi

Course ID#: C1420

Monday, Oct. 20, 2014: 8:30am-12:30pm

Overview

SAE International is pleased to offer this professional development seminar in conjunction with the SAE A-6 Aerospace Actuation, Control and Fluid Power Systems Committee meeting Oct. 20-23 Santa Barbara, CA.

This 4 hour short course provides an overview of Power Electronics (PE) in use in modern transport aircraft. This course includes the context, principles, design drivers, and the main PE components of various flight applications, including those for harsh environments. This course is designed to deliver and demystify the basic theories and best practices of mechanical, electronics, thermal management, safety, reliability and maintainability disciplines. In addition, future trends in Power Electronics will be discussed.

Objectives

By attending this seminar, you will be able to:

- Explain and evaluate the use of the power electronics in various aircraft systems
- Identify and explain the various PE architectures
- Identify the main requirements and technical drivers to develop PE units
- Identify the various components of PE equipment
- Evaluate lessons learned from existing PE products flying in various commercial aircraft

Target Audience

This seminar is designed for engineers, in particular “mechanical” engineers, executives, and other key personnel with little or no previous electronics knowledge or experience. The information presented in this course will also benefit individuals from the production and support disciplines, including airlines and maintenance repair organizations.

Topics Covered

- Design Theory
 - Fundamentals of Power Electronics
 - Typical motor control architecture
- Component Functions and Technologies
 - Active components
 - IGBT, MOSFET
 - Passive components
- Harsh Environments
 - Aircraft context
 - Main design drivers for PE equipment
 - Some examples of applications
- Other Environmental Constraints
 - EMI, Lightning
 - Thermal management
 - Aircraft quality electrical network
- Best Practices
 - Multidisciplinary approach
 - Lessons learned examples
 - Best practices for PE
- Future Trends

Instructor: Michel Todeschi

Michel Todeschi is currently Head of the Electromechanical Actuation and THSA group within the Aircraft Control domain within the Airbus Group. He was appointed to his current position in 2008 and is in charge of the management of R&T, design, development, validation and in-service engineering support of the Electromechanical Actuation and THSA for all Airbus models from A320 to A380, A400M and A350. In addition, Mr. Todeschi holds the Senior Expert position in Electrical Actuation and Power Electronics within the Airbus Group. He started as a development engineer for the A330/A340 program and research programs. In 2001, He was appointed to the A380 program as Task Leader where he led the team in charge of the development of the A380 Primary Flight Control Actuation. In particular, he was responsible for the introduction into service of Electrohydrostatic Actuators (EHAs) and associated Power Electronics Modules in Commercial Aircraft applications. Mr. Todeschi contributes to the SAE-A6 Aerospace Actuation, Control and Fluid Power Systems as a member of the Flight Control Systems, EMA and EHA/IAP panels. He received his M.S. in Electronic Engineering from ENSEEIHT, Toulouse.

Registration Fee: \$295

CEUs: .4

Aircraft Hydraulic Pumps – Application, Design and Integration

Instructor: Peter A. Stricker

Course ID#: C1419

Monday, Oct. 20, 2014: 1:30 pm-5:30pm

Overview

SAE International is pleased to offer this professional development seminar in conjunction with the SAE A-6 Aerospace Actuation, Control and Fluid Power Systems Committee meeting Oct. 20-23 Santa Barbara, CA.

This 4 hour short course offers an overview of aircraft hydraulic pumps focusing on their application in hydraulic systems, design and performance characteristics, and integration issues. These topics will examine the various pump technologies available for aircraft system applications, their design, performance and operational characteristics and limitations, and discuss the challenges and lessons learned in the integration of pumps in hydraulic systems.

Objectives

By attending this seminar, you will be able to:

- Identify the various pump and pump control technologies used in common hydraulic systems
- Evaluate the design characteristics and limitations inherent in applying the various technologies of pumps in their application in hydraulic systems
- Evaluate the critical aspects of integration of pumps in hydraulic systems, such as controlling air entrainment, heat removal, and back-up strategies
- Evaluate the interfaces between pumps, hydraulic systems and other aircraft systems

Target Audience

This seminar is designed for engineers, executives, and other key personnel with some experience in hydraulic pump design or system integration. The former will benefit in understanding the application and integration of pumps, while the latter will benefit in understanding the complexities and limitations of current pump designs.

Topics Covered

- General
 - Hydraulic systems overview
 - Brief history of aircraft hydraulics
 - Hydraulic pump technologies overview
- Application of Hydraulic Pumps
 - Engine Driven Pumps
 - Electric Driven Pumps
 - Others, such as Air Driven and Hydraulic Driven Pumps (PTU's)
- Design of Hydraulic Pumps
 - Pumping Technologies
 - Fixed / Variable displacement
 - Axial piston inline
 - Bent axis

- Critical Design Factors
 - PV factors
 - Dynamic characteristics
 - Inlet conditions
 - Control of pumps
- Flow / Pressure / Torque performance characteristics
- Integration Challenges and Lessons Learned
 - Starting Issues
 - Engine driven pump torque control
 - Electric motor pump inrush current
 - Air ingestion control
 - Fluid conditioning
 - Heat rejection / Case drain flow
 - Pressure ripple control
- Overview of Industry Specifications and Other Reference Material

Instructor: Peter A. Stricker

Mr. Stricker has 35 years' experience in the aerospace industry, working on hydraulic systems and components for Vickers, which was later acquired by Eaton Corporation. During the first twenty years, he was engaged in the engineering design and development of hydraulic pumps, motors and integrated systems for commercial, military fixed and rotor wing aircraft, as well as ground defense vehicles. During the last fifteen years, Mr. Stricker has been involved in the Sales and Marketing side of the business, providing technical sales and marketing support and financial modeling for commercial and military aircraft hydraulic systems. Beginning during the spring of 2014, he will be "semi-retired", working on selected engineering projects. Mr. Stricker is currently Vice Chairman of the Power Sources Panel of SAE Committee A6, Aerospace Actuation, Control and Fluid Power Systems. He has authored two recent SAE documents, AIR5872 Aerospace Hydraulic Pump Controls and ARP4940 Application Guide for Aerospace Hydraulic Motors. Mr. Stricker holds a B.S. Mechanical Engineering from McGill University, a M.S. Mechanical Engineering from the University of British Columbia, and an M.B.A. from Millsaps College. He has been a registered Professional Engineer in the State of Mississippi since 1980.

Registration Fee: \$295

CEUs: .4