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June 2011 – June 2012

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- Systems and Components

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P110985

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Digital Avionics Fiber Optics Technology and Standards for Aerospace

Duration - 1 Day

For additional seminar information and to view upcoming open enrollment dates, visit: **www.sae.org/pdevent/C0924**

Once used only sparingly in select digital avionics air vehicle interconnect applications, fiber optics technology has gained widespread acceptance and is becoming increasingly prevalent as standard equipment on modern aerospace platforms. As such, most new aerospace platform or retrofit programs include a fiber optic trade study in its conceptual and system design and development process. This comprehensive seminar introduces participants to aerospace fiber optics technology. Additionally, this seminar provides an overview of important standards that are available to them during the system design and development process. This one-day seminar begins with a discussion on the basic physics of light and its application to fiber optics. Following a fundamental overview of fiber optic cable, connector, and transceiver technologies, participants learn about supportability, maintainability, manufacturing quality, and installation concerns, with emphasis given to design interface controls and life cycle cost parameters. Prior lessons learned are summarized with an emphasis on aerospace fiber optic design engineering and support principles. The seminar concludes with an in-depth description of relevant military and aerospace standards along with an example digital fiber optic system design and development methodology case study.

Learning Objectives

By attending this seminar you will be able to:

- Explain the basic physics of light and how light couples into and out of an optical fiber
- Identify the benefits of fiber optics technology applied to aerospace platforms
- Define the construction and performance of aerospace fiber and fiber optic cable
- Identify how fiber optic connections are made on aerospace platforms
- Identify how fiber optic cables and connectors are selected for aerospace applications
- Appraise digital fiber optic transmitter and receiver parameters
- Identify digital fiber optic link characteristics and design principles, and avionics fiber optic interface control parameters
- Recognize the key underlying elements of aerospace fiber optic supportability, reliability and maintainability and their relationship to life cycle cost
- Identify fiber optic cable termination best practices for aerospace
- Relate the content and application of SAE and MIL standards to avionics fiber optic system design and specification
- Recognize future directions for avionics fiber optics and photonics technology

Who Should Attend

This seminar will benefit any aerospace contractor residing in the aerospace fiber optics supply chain including component manufacturers, subsystem providers, system integrators, engineers, research scientists, instructors, technicians, logisticians, and students

Prerequisites

Basic understanding of physics and electronics.

Seminar Content

- The Basic Physics of Light and its Application to Fiber Optics
- Introduction to Fiber Optics Technology
  - Singlemode fiber; Multimode fiber
- Avionics Fiber Optic Cable Assemblies
  - Fiber optic cable, termini, connectors
  - Fiber optic cable assembly testing
- Digital Fiber Optic Transmitters and Receivers (Transceivers)
- Digital Fiber Optic Transmitter and Receiver Packaging Technology
- Digital Fiber Optic Link Design and Testing Principles
  - Interface control document
  - Link loss power budget
  - Fiber optic cable optical testing and fiber optic link bit error rate testing
- Fiber Optic Cable Assembly Qualification
- Aerospace Fiber Optic System Supportability and Maintainability
- Relevant Standards Organizations
- SAE and MIL Fiber Optic Standards
- System Design and Development Case Study
- Future Directions for Avionics
- Closing and Evaluations

Instructor: Mark Beranek

Mark Beranek has 20 years combined experience at Boeing and Naval Air Systems Command (NAVAIR) working in the aerospace fiber optics and photonics research and engineering field. His program experiences span commercial aircraft, military aircraft, and space vehicle fiber optics development and acquisition, and government and corporate-sponsored fiber optics and photonics science and technology programs. More recently, Mr. Beranek has been working on military aircraft fiber optics acquisition and science & technology programs in the areas of advanced component design, qualification, standardization, supportability, maintainability and manufacturing technology development. Mr. Beranek has held fiber optics committee chairmanship positions for the IEEE Components, Packaging and Manufacturing Technology Society, IEEE Lasers and Electro-Optics Society and IEEE Photonics Society, and the SAE Avionics Systems Division. Mr. Beranek holds a B.S. in Technology and Management from the University of Maryland, University College, a B.S. in Chemistry from Northern Illinois University, and an A.S. Certificate in Electronics from Harper College.

Registration Information:
Course I.D.# C0924
Fees: $725; **SAE Members – Classic:** $653
Premium: $616; **Elite:** $580
0.7 CEUs

REGISTRATION INFORMATION

If you have a disability that may impact your participation in this seminar, please call 2 weeks prior to the start date so that we can address your needs.

Condition of Sale: If you cannot attend, you may send a substitute or transfer to a future offering. The member discount may be adjusted based on the substitute's SAE membership level. A full refund is issued if you notify SAE at least 14 days prior to seminar start date. If canceled less than 14 days prior, the full fee is charged. For $50, you may process a one-time transfer to a future offering within one year of canceled seminar. Canceling may reduce group discounts. To cancel, transfer or send a substitute, call SAE Customer Service at 1-877-606-7323 or 1-724-776-4970. For the SAE Membership registration rates, member dues must be current at the start of the event.

Note: SAE reserves the right to change instructors or cancel seminars and cannot be held responsible for costs incurred other than the registration fee. Prices subject to change.

KEY

CERTIFICATE PROGRAM ACTAR APPROVED SEMINARS WEBINARS

Introduction to AS5553 and Counterfeit Electronic Parts Avoidance Training

Duration – 1 day

For additional seminar information and to view upcoming open enrollment dates, visit: **www.sae.org/pdevent/C0950**

Counterfeit electronic parts have been found in almost every sector of the electronics industry and continue to be an increasing threat to electronic hardware. This threat poses significant performance, reliability and safety risks. Aerospace industry organizations, in particular, must produce and continually improve safe and reliable products that meet or exceed customer and regulatory authority requirements. The SAE AS5553 standard was created in response to the significant and increasing volume of counterfeit electronic parts entering the aerospace supply chain and standardizes requirements, practices and methods for counterfeit parts risk mitigation. The resulting document presents solutions to address counterfeit electronic parts issues across a large cross-section of the electronics industry. This comprehensive one-day seminar introduces participants to AS5553 and specifically addresses counterfeit part risk mitigation methods in electronic design and parts management, supplier management, procurement, part verification, material control, and response strategies when suspect or confirmed counterfeit parts are discovered. The seminar will provide information and guidance in each of these key requirement areas. The latter part of the course will highlight counterfeit detection techniques and part compliance verification methods. Several examples of counterfeit parts will be reviewed in detail. The course will conclude with a hands-on learning exercise in identifying, under a microscope, characteristics that can be found in counterfeit electronic parts. To accomplish this, attendees are encouraged to bring a personal laptop computer. The instructors will provide a limited number of digital microscopes and electronic parts. In addition to the seminar handout, a copy of the AS5553-Counterfeit Electronic Parts; Avoidance, Detection, Mitigation, and Disposition standard is provided to each registrant.

Learning Objectives

By attending this seminar, you will be able to:

- Characterize and describe the threat of counterfeit electronic parts
- Identify the characteristics of an effective Counterfeit Parts Control Plan
- Demonstrate one of the first steps in verification of purchased product (inspection techniques for counterfeit parts)
- Recognize suspect counterfeit parts

Who Should Attend

This seminar will benefit a wide range of individuals and experience levels across the electronics industry and supply chain. Anyone who designs, specifies, buys, receives, assembles and tests electronic hardware will benefit from this seminar. This includes electronic design engineers, parts engineers, quality assurance engineers, buyers, auditors, inspectors, assemblers, electronic test engineers, microelectronic non-destructive test engineers, destructive test analysts, and supplier managers. Additionally, this seminar will benefit individuals in various levels of management that influence electronic hardware.

Seminar Content

- AS5553
  - Terms and definitions
  - Magnitude and impact of counterfeiting
  - Counterfeit electronic part examples
  - G-19 Committee and its challenges
  - AS5553 structure
  - Requirements
  - Counterfeit electronic parts control plan
  - Parts availability
  - Purchasing processes
  - Procurement contract requirements
  - Verification of purchased product
  - Control of suspect or confirmed counterfeit parts
  - Reporting
  - Future G-19 plans
- Counterfeit Parts Recognition
  - Terms and definitions
  - Types of counterfeits
  - E-Waste
  - Documentation review
  - Slides of counterfeit parts and their features
  - Non-destructive and destructive testing for counterfeits
  - Hands-on inspection with microscopes

Instructors: Phil Zulueta and Katherine Whittington

Phil Zulueta manages the Hardware Technology Assurance Group at the Jet Propulsion Laboratory, where he leads a team of engineers and technologists involved in Electronics Packaging Assurance Technologies, Non-destructive Evaluation, Electronics Manufacturing Technology Transfer (Training) and Certification, Electronics Inspection, Optical Metrology and Electro-Static Discharge (ESD) Awareness and Control. He is a JPL Program Element Manager for the NASA Electronic Parts and Packaging (NEPP) Program, facilitates the Counterfeit Parts Working Group meetings at JPL and Chairs the SAE G-19 Counterfeit Electronic Parts Committee. His education includes an MBA from Pepperdine University and a B.S. in Materials Engineering from California State University Long Beach.

Katherine Whittington is a Staff Engineer in the Electrical Parts Engineering organization at the Jet Propulsion Laboratory. She works as an analog parts specialist, and has been teaching a counterfeit parts awareness class at JPL since 2008. She has been a member of JPL's Counterfeit Parts Working Group (CPWG) since 2007. She holds a B.S. in Physics from UC Berkeley. She has extensive flight experience and holds an Airline Transport Pilot certificate.

Registration Information:
Course I.D.# C0950
Fees: $785; **SAE Members – Classic:** $707
Premium: $667; **Elite:** $628
0.7 CEUs

Interested in having one of these seminars at your company?

If so, please call SAE's Corporate Learning Solutions hotline at 1-724-772-8529, or complete the online form at www.sae.org/corplearning

KEY

CERTIFICATE PROGRAM ACTAR APPROVED SEMINARS WEBINARS

Design for Manufacturing & Assembly (DFM/DFA)

Duration – 2 Days

For additional seminar information and to view upcoming open enrollment dates, visit: **www.sae.org/pdevent/92047**

Design for Manufacturing and Assembly (DFM+A), pioneered by Boothroyd and Dewhurst, has been used by many companies around the world to develop creative product designs that use optimal manufacturing and assembly processes. Correctly applied, DFM+A analysis leads to significant reductions in production cost, without compromising product time-to-market goals, functionality, quality, serviceability, or other attributes. In this two-day seminar, you will not only learn the Boothroyd Dewhurst Method, you will actually apply it to your own product design! This seminar will include information on how DFM+A fits in with QFD, concurrent engineering, robust engineering, and other disciplines. In addition, there will be a brief demonstration of computer software tools, which simplify the DFM+A analysis.

Each participant will receive and use the hard-bound authoritative reference textbook, *Product Design for Manufacture and Assembly*, written by Geoffrey Boothroyd, Peter Dewhurst and Winston Knight.

Learning Objectives

By attending this seminar, you will be able to:
- Perform Design for Assembly (DFA) Analysis using the BDI Manual (Worksheet) Method
- Perform DFM Analysis (manufacturing cost estimation)
- Apply Design for Service (DFS) Principles
- Reduce your company's production costs by analyzing and eliminating the factors that greatly affect the time, cost, and quality of manufacturing, assembly and service processes
- Utilize effective analysis, brainstorming, and trade-off techniques for redesigning assemblies and subassemblies

Who Should Attend

Product designers, product engineers, or manufacturing engineers will benefit by attending this seminar. Individuals involved in a new or ongoing product development process will also benefit by learning how to help synchronize and optimize fabrication and assembly activities. This course is most effective when attended by product development team members; however, this is not a requirement for attendance. NOTE: You are strongly encouraged to bring a sample or drawing of one of your own designs to analyze during the workshop on Day Two. You are also asked to bring a calculator capable of making simple calculations.

Prerequisites

An engineering undergraduate degree in any discipline would be beneficial.

Seminar Content

DAY ONE
- What is DFM+A
  - The history of DFM+A
  - The various "Design fors"
  - Why companies are using DFM+A
  - DFM+A success stories
  - DFM+A benefits
  - Key factors in ensuring DFM+A success
- DFA Good Design Principles
  - The Boothroyd Dewhurst Design for Manual Assembly Method
  - Using the manual handling and insertion tables
  - Determining theoretical minimum part count
  - Filling in the BDI DFA worksheet
  - Computing the DFA Index
- DFA Baseline Analysis Exercise (Pneumatic Piston)
- Redesign Project (Pneumatic Piston Assembly)
  - Developing design concepts
  - Identifying conservative and "stretch" designs
  - Selecting the best DFA concept
  - Analysis of redesign
  - Presentation of team results
- General Approach to Manufacturing Cost Estimation
  - Manufacturing cost drivers
  - Estimating piece cost
  - Cost calculation exercise
- BDI Design for Manufacture (DFM) Cost Estimation
  - Injection molding cost algorithms
  - Sample calculation
  - Exercise (analyzing part from pneumatic piston)

DAY TWO
- BDI DFM Cost Estimation (continued)
  - Review of die casting and/or sheet metal stamping cost algorithms
- Design for Service (DFS) Assessment
  - Two main approaches
  - Life cycle considerations
  - DFS exercise
- BDI DFM/A Software Toolkit Demonstration
  - DFA module
  - Injection molding or other module
- DFM+A Workshop Checklist
- Brainstorming Guidelines
- DFM+A Workshop Project (approximately 4 hours)
  - Project selection (from those brought to class)
  - Team identification
  - Baseline analysis
  - Redesign development
  - Development of project reports (illustrations, action plan, possible roadblocks, etc.)
  - Presentations of team results
- Institutionalizing DFM+A in Your Organization
  - How DFM+A fits in with other strategies
  - Lessons learned from other companies
  - Ideal workplace implementation plan
- Video Presentation on Goal Setting (time permitting)
- Wrap Up
- Course Evaluation

Instructor: Kevin Zielinski

Kevin Zielinski currently owns and operates Red Cedar Media LLC, a training and corporate communications consulting, design, development and delivery company based in Michigan. Previously, Kevin was Senior Applications Specialist for EDS (including General Motors/EDS and Hewlett Packard/EDS) specializing in technical training delivery, training consulting, courseware design and development, and e-Learning. He has designed, developed and delivered over 40 lecture- and web-based courses attended by General Motors and EDS employees worldwide. Mr. Zielinski has also served as Adjunct Professor for the Wayne State University College of Engineering and WSU/Focus:Hope for many years. His areas of expertise include: e-Learning design and development, Quality Tools and Methods (Design of Six Sigma, Robust Engineering, Design of Experiments (DOE), Statistical Tolerancing and GD&T); Design for Manufacturing and Assembly (DFMA); Engineering Economics; and Plant Floor Throughput Improvement. He has been an instructor for SAE Professional Development since 1990, and is a recipient of SAE's Forest R. McFarland Award (April 2005). He holds a bachelor's and master's degree in engineering from Wayne State University.

Registration Information:
Course I.D.# 92047
Fees: $1,395; **SAE Members – Classic:** $1,256
Premium: $1,186; **Elite:** $1,116
1.3 CEUs

Design FMEA Update: What's New in J1739 Webinar

Three, two-hour sessions

For additional seminar information and to view upcoming open enrollment dates, visit: **www.sae.org/pdevent/WB0955**

The new J1739 has been revised to address common problems with the application of Design FMEA today. Such problems include the time spent debating ranking systems, potential problems hidden in the Risk Priority Number, false starts and rework of FMEA because of a lack of understanding of product and process functions, and a lack of emphasis on prevention controls or early detection of problems. This course is not intended to cover all of the details of completing a Design FMEA. Rather, its focus is on recent changes from the former J1739 FMEA Recommended Practice to the new J1739 FMEA Standard and how those familiar with performing Design FMEA should adjust their approach.

Similarities in content exist between this course and the Process FMEA Update: What's New in J1739 Webinar, however each is uniquely designed to address what's new for each type of analysis.

Learning Objectives

By connecting with this webinar, you will be able to:
- Identify new DFMEA requirements that must be fulfilled by management
- Find answers to most DFMEA questions in J1739
- Align ideas within the logical framework of the DFMEA worksheet
- Apply new risk assessment evaluation criteria to the DFMEA
- Compare the differences between using Risk Priority Number thresholds with using other risk assessment criterion such as the use of Severity and Occurrence when prioritizing actions for risk mitigation

Who Should Attend

Product engineers, manufacturing engineers, quality engineers, supplier quality engineers, validation and test engineers, and FMEA facilitators, trainers and consultants primarily in, but not limited to, the automotive industry may be interested in the update this webinar offers. Beginning engineers and advanced/senior engineers who must participate in FMEA, as well as those that manage FMEA activity, will also gain valuable insights. If you have a copy of the SAE J1739 standard, we recommend that you have it at hand for all three sessions of the webinar. If you do not own the standard and wish to purchase a copy, go to SAE J1739 Standard.

Webinar Content

- Introduction and Potential Failure Analysis
  - Concerns about FMEA usage
  - Key change points applicable to Design FMEA
  - Terms and definitions
  - Pre-Analysis Preparation
  - DFMEA product functions and requirements
  - Failure Modes and Effects
  - Failure Causes
  - Current design controls - prevention
  - Current design controls - detection
- Risk Assessment
  - Severity ranking criteria - emphasis on vehicle level
  - Occurrence ranking criteria - emphasis on what's known and unknown about design
  - Detection ranking criteria - emphasis on method and timing of evaluation
  - Risk Priority Numbers - secrets RPN won't tell
  - Severity x Occurrence - back to the beginning
  - Severity AND Occurrence - go for a meaning, not a number
  - Other risk assessment criteria
- Risk Mitigation
  - FMEA general requirements
  - DFMEA outputs
  - DFMEA form and example
  - Special characteristics and DFMEA
  - Writing effective action plans to mitigate risk

Instructor: Bill Haughey

Bill Haughey is a respected consultant and instructor in the areas of Failure Modes Effects Analysis, Design for Manufacturability and Assembly, Design Review Based on Failure Modes, Design Review Based on Test Results, and other GD3 methodologies. He is a current member of the issuing committee of the SAE J1739 FMEA standard, SAE Automotive Quality and Process Improvement Committee; the SAE Automotive Electronic Systems Reliability Standards Committee; and the AIAG FMEA Fourth Edition Recommended Practice Committee. Mr. Haughey was recently approved to lead the development of a new SAE DRBFM Recommended Practice (J2886). Mr. Haughey received a B.S. degree from the University of Michigan and M.S from Central Michigan University, and has the following certifications: Black Belt in GD3 (DRBFM and DRBTR); Master Design for Manufacturability and Assembly Engineer; and Certified Internal Auditor.

Registration Information:
Course I.D.# WB0955
Fees: $515; **SAE Members – Classic:** $464
Premium: $438; **Elite:** $412
0.7 CEUs

Fundamentals of Geometric Dimensioning & Tolerancing (GD&T) Webinar

Eight, two-hour sessions

For additional seminar information and to view upcoming open enrollment dates, visit: **www.sae.org/pdevent/WB0933**

Geometric dimensioning and tolerancing (GD&T) is used as a symbolic way of showing specific tolerances on drawings. GD&T is a valuable tool that effectively communicates the design intent to manufacturing and inspection. It is governed by the technical standard ASME Y14.5M-1994, which was updated earlier this year. This course introduces participants to the GD&T system, providing a working knowledge of the correct interpretation and application of each symbol, general rules, the datum system, and 'bonus' tolerance and highlighting some of the changes in the updated Y14.5 standard. The material is reinforced with many practice exercises.

Learning Objectives

By connecting with this webinar, you will be able to:
- Explain the benefits of geometric tolerancing
- Identify datum features and determine their order of precedence
- Identify and interpret each of the characteristic symbols
- Describe the material condition modifiers and how "bonus" tolerance occurs
- Correctly interpret GD&T feature control frames, and explain the impact on manufacturing and inspection

Who Should Attend

This course is ideal for anyone who has a need to apply or interpret geometric tolerances on a product print. Product engineers, manufacturing engineers, CAD designers, quality inspectors, and other engineering and manufacturing personnel will all benefit from a better understanding of design requirements; improved communication with customers and suppliers; and improving designs by taking advantage of bonus tolerance and other GD&T benefits. Participants should have an understanding of basic blueprint reading.

Webinar Content

- Why Use GD&T?
  - Review of traditional dimensioning
  - Benefits of GD&T
  - Technical standards

  - Definitions
  - Basic dimensions
  - How to read the feature control frame
- Rules and the Form Symbols
  - Rule #1: Size controls form
  - Rule #2: Assume RFS
  - Flatness
  - Surface straightness
  - Circularity
  - Cylindricity
- Bonus Tolerance
  - GD&T applied to a feature of size
  - Bonus and the MMC modifier
  - Virtual conditon
  - Gaging and inspection of GD&T
- Datums
- Datum vs. datum feature
- The datum reference frame
- Primary, secondary, and tertiary datums
- Profile and Orientation
  - General definition of profile
  - Profile of a line
  - Profile of a surface
  - Use of datums with profile
  - Perpendicularity
  - Angularity
  - Parallelism
- Position Tolerance I
  - True position
  - Position tolerance RFS
  - Using MMC or LMC
  - The "boundary" concept
  - The pitch diameter rule
- Position Tolerance II
  - Projected tolerance zone
  - Inspecting parts for position
  - Calculating tolerance values
  - Composite position tolerance
- Symmetry and Coaxial Controls
  - Concentricity
  - Symmetry
  - Circular runout
  - Total runout
- Wrap-up

Instructor: John-Paul Belanger

John-Paul Belanger is president of Geometric Learning Systems, a consulting firm specializing in geometric dimensioning and tolerancing (G D & T). For over ten years, he has trained people throughout North America and Europe in the proper interpretation and application of G D & T per the Y14.5 standard by using practical examples. Mr. Belanger is certified by the American Society of Mechanical Engineers as a Senior G D & T Professional, and has worked with a wide range of companies in the automotive, aerospace, electronic, and other industries to apply tolerances and perform stack calculations. He holds a B.S. in aerospace engineering from the University of Michigan specializing in aircraft design and safety.

Registration Information:
Course I.D.# WB0933
Fees: $915; **SAE Members – Classic:** $824
Premium: $778; **Elite:** $732
1.6 CEUs

New Introduction to Design Review Based on Failure Modes (DRBFM) Webinar

Three, two-hour sessions

For additional seminar information and to view upcoming open enrollment dates, visit: **www.sae.org/pdevent/WB1047**

Design Review Based on Failure Modes (DRBFM) is a methodology focused on change management and continuous improvement. It centers on early prevention and engineering knowledge, eliminating time spent debating ranking systems, waiting for lead engineers to document and list their concerns, identifying what types of concerns are open for discussion and resolution, and brainstorming without any actionable closure.

This Webinar will explain all phases of the DRBFM methodology and provides details on how to accomplish the specific steps. A DRBFM Process Guidebook will provide specific information on each step with formats, examples, notes and homework slides and will follow the defined steps of the new SAE J2886 DRBFM Recommended Practice (under development). Similarities in content between DRBFM and FMEA will be discussed, however the focus will be on conducting DRBFM methodology.

This DRBFM Webinar will provide roles and responsibilities of management, design engineers, manufacturing engineers, facilitators and technical experts. Those interested in DRBFM will benefit from understanding the rationale behind this methodology and learn to guide teams through the paradigm shifts and mind set that are needed.

Learning Objectives

By connecting with this webinar, you will be able to:
- Outline the fundamental steps of DRBFM methodology, including:
- DRBFM Plan and analysis requirements
- Necessary preparation feeding DRBFM analysis
- The two phases of DRBFM analysis
- Documentation of design, validation and manufacturing actions
- Feedback loop into engineering knowledge documents
- Explain the intent and format of the DRBFM worksheets
- Predict what it takes to gain and maintain proficiency and consistent application of the methodology
- Find answers to most DRBFM questions

Who Should Attend

Product engineers, manufacturing engineers, quality engineers, supplier quality engineers, validation and test engineers, and facilitators, trainers and consultants in all industries. This webinar will benefit beginning engineers, advanced and senior engineers and managers who must participate in FMEA's and DRBFM.

Webinar Content

- DRBFM Procedure, Forms, Planning and Preparation
  - Process Guide and Workbook Overview
  - Scope and Purpose
  - Process Map - General Requirements
  - Planning - Formats, examples, homework
  - Planning Results and Output
  - Preparation - Formats, examples, homework
  - Preparation Results and Linkage with DRBFM Format
  - Definition of Change Section
- DRBFM - Forum 1, Design Review, Action Results and Follow Up
  - DRBFM Forum 1 - Engineer analysis
  - Change Point definition

  - Identification of concerns
  - Identification of causes and influences on the vehicle
  - Identification of effects
  - Identification of severity/priority
  - Actions to gain engineering knowledge - evidence
- DRBFM - Forum 2, Design Review, Action Results and Follow Up
  - DRBFM Forum 2 - Design Review introduction
  - Change Point overview
  - Identification of additional concerns
  - Identification of additional causes and influences on the product
  - Identification of effects
  - Identification of severity/priority
  - Actions taken to eliminate concerns
  - Design actions to gain engineering knowledge - evidence
  - Validation actions to gain evidence of reliability
  - Manufacturing, assembly, and supplier actions
  - Action results and feedback to design guidelines
  - Roles and responsibilities

Instructor: Bill Haughey

Bill Haughey is a respected consultant and instructor in the areas of Failure Modes Effects Analysis, Design for Manufacturability and Assembly, Design Review Based on Failure Modes, Design Review Based on Test Results, and other GD3 methodologies. He is a current member of the issuing committee of the SAE J1739 FMEA standard, SAE Automotive Quality and Process Improvement Committee; the SAE Automotive Electronic Systems Reliability Standards Committee; and the AIAG FMEA Fourth Edition Recommended Practice Committee. Mr. Haughey was recently approved to lead the development of a new SAE DRBFM Recommended Practice (J2886). Mr. Haughey received a B.S. degree from the University of Michigan and M.S from Central Michigan University, and has the following certifications: Black Belt in GD3 (DRBFM and DRBTR); Master Design for Manufacturability and Assembly Engineer; and Certified Internal Auditor..

Registration Information:
Course I.D.# WB1047
Fees: $515; **SAE Members – Classic:** $464
Premium: $437; **Elite:** $412
0.6 CEUs

Process FMEA Update: What's New in J1739 Webinar

Three, two-hour session

For additional seminar information and to view upcoming open enrollment dates, visit: **www.sae.org/pdevent/WB0956**

The new J1739 has been revised to address common problems with the application of Process FMEA today. Such problems include the time spent debating ranking systems, potential problems hidden in the Risk Priority Number, false starts and rework of FMEA because of a lack of understanding of process functions, and a lack of emphasis on prevention controls or early detection of product defects. This course is not intended to cover all of the details of completing a Process FMEA. Rather, its focus is on recent updates to the J1739 standard and how those familiar with performing Process FMEA should adjust their approach. Similarities in content exist between this course and the

Design FMEA Update: What's New in J1739 Webinar, however each is uniquely designed to address what's new for each type of analysis.

Learning Objectives

By connecting with this webinar, you will be able to:
- Identify new PFMEA requirements that must be fulfilled by management
- Find answers to most PFMEA questions in J1739
- Align ideas within the logical framework of the PFMEA worksheet
- Apply new risk assessment evaluation criteria to the PFMEA
- Compare the differences between using Risk Priority Number thresholds with using other risk assessment criterion such as the use of Severity and Occurrence when prioritizing actions for risk mitigation

Who Should Attend

Manufacturing engineers, product engineers, quality engineers, supplier quality engineers, validation and test engineers, and FMEA facilitators, trainers and consultants primarily in, but not limited to, the automotive industry may be interested in the update this webinar offers. Beginning engineers and advanced/senior engineers who must participate in FMEA, as well as those that manage FMEA activity, will also gain valuable insights. If you have a copy of the SAE J1739 standard, we recommend that you have it at hand for all three sessions of the webinar. If you do not own the standard and wish to purchase a copy, go to SAE J1739 Standard.

Webinar Content

Session 1
- Introduction and Potential Failure Analysis
  - Concerns about FMEA usage
  - Key change points applicable to Process FMEA
  - How to use J1739
  - Terms and definitions
  - Pre-Analysis preparation
  - PFMEA product and process functions and requirements
  - Failure Modes and Effects
  - Failure Causes
  - Current process controls - prevention
  - Current process controls - detection Session 2
- Risk Assessment
  - Severity ranking criteria - emphasis on vehicle level
  - Occurrence ranking criteria - the change that impacts the RPN immediately
  - Detection ranking criteria - emphasis on method and location of evaluation
  - Risk Priority Numbers - secrets RPN won't tell
  - Severity x Occurrence - back to the beginning
  - Severity AND Occurrence - go for a meaning, not a number
  - Other risk assessment criteria Session 3
- Risk Mitigation
  - FMEA general requirements
  - PFMEA outputs
  - PFMEA form and example
  - Special characteristics and PFMEA
  - Writing effective action plans to mitigate risk

Instructor: Bill Haughey

Bill Haughey is a respected consultant and instructor in the areas of Failure Modes Effects Analysis, Design for Manufacturability and Assembly, Design Review Based on Failure Modes, Design Review Based on Test Results, and other GD3 methodologies. He is a current member of the issuing committee of the SAE J1739 FMEA standard, SAE Automotive Quality and Process Improvement Committee; the SAE Automotive Electronic Systems Reliability Standards Committee; and the AIAG FMEA Fourth Edition Recommended Practice Committee. Mr. Haughey was recently approved to lead the development of a new SAE DRBFM Recommended Practice (J2886). Mr. Haughey received a B.S. degree from the University of Michigan and M.S from Central Michigan University, and has the following certifications: Black Belt in GD3 (DRBFM and DRBTR); Master Design for Manufacturability and Assembly Engineer; and Certified Internal Auditor.

Registration Information:
Course I.D.# WB0956
Fees: $515; **SAE Members – Classic:** $464
Premium: $438; **Elite:** $412
0.7 CEUs

Design Reviews for Effective Product Development

Duration – 1 Day

For additional seminar information and to view upcoming open enrollment dates, visit: **www.sae.org/pdevent/C0004**

Design reviews are required for ISO 9001:2000 compliance and compatible automotive and aerospace specifications. They are becoming increasingly important in product liability litigation and are accepted as a cost-effective best practice and an effective application of knowledge management, valuable for accelerating the maturity of new products. This seminar describes how formal design reviews can improve products by uncovering potential problems before they are discovered at a later stage of development or application, when the costs of correction are much higher. A broad range of effective techniques for organizing and conducting design reviews will be presented. Specific guidance and tools to assist attendees in structuring design reviews tailored to their own company, specification, or contract requirements will also be provided. Material covered will be applicable to all types of development programs, ranging from components to complete vehicles, and for both OEMs and suppliers.

Learning Objectives

By attending this seminar, you will be able to:
- Describe the relationship of the process to concurrent engineering and knowledge management
- Establish the requirements for a successful design review process
- Describe the types and timing of reviews
- Organize a typical design review
- Conduct a review and get positive results

Who Should Attend

The seminar is designed for individuals who are involved in the development of new products and who seek to improve that process. Product development team members including, but not limited to, directors, managers, project and program managers, design, development, process, product, quality, and application engineers will find the course valuable. It is aimed primarily at engineers and managers who would be facilitating or leading such reviews, but will also benefit manufacturing, marketing and purchasing personnel.

Prerequisites

An engineering education and experience with product development is desirable but not necessary.

Seminar Content
- Why Design Reviews are Widely Used Today
  - Market drivers
  - Quality drivers
  - Schedule and cost drivers
  - Litigation considerations
- What Design Reviews Are and Are Not
- Current Specification Requirements
  - ISO 9001
  - QS9000
  - AS9000
- Outline of the Design Review Process
  - Relation of design reviews to: concurrent engineering; integrated product development teams; knowledge management
- Types and Timing of Reviews
  - Concept reviews
  - Preliminary reviews
  - Critical reviews
  - Production readiness reviews
  - Other types of reviews
- Scope of Design Reviews
- Formal and Informal Reviews
- The Key Ingredients for a Successful Review
- How to Organize an Effective Design Review
  - Participants
  - Invitations
  - Preparation for a review
  - Duration of a review
  - Physical arrangements
- How to Conduct a Design Review
  - Importance of a positive tone
  - Some proven procedures, check lists, comment sheets
  - Handling problem participants
- Closure and Follow-up
- Reports
- Implementation
- Review of Experiences of Participants

Instructor: Angelo Mago

Angelo Mago is senior consultant and owner of ATM Consulting, Inc., which provides customized training and consulting services to the supplier community in the areas of quality assurance, quality control, design engineering, document management, and customer service and improvement methods. He has over 20 years of experience in product design, quality assurance, management and most recently worked as the Senior Supplier Quality Engineer for GM Truck Group responsible for PPAP qualification and approval. Mr. Mago is a recipient of the SAE Forest R. McFarland Award for distinction in professional development/education. He has a B.S. in Mechanical Engineering from Florida Institute of Technology.

Registration Information:
Course I.D.# C0004
Fees: $725; **SAE Members – Classic:** $653
Premium: $616; **Elite:** $580
0.7 CEUs

Failure Modes and Effects Analysis (Product & Process) in Aerospace

Duration – 2 Days

For additional seminar information and to view upcoming open enrollment dates, visit: **www.sae.org/pdevent/C0939**

This interactive Failure Modes and Effects Analysis (FMEA) product and process seminar introduces the participant to the analytical process by which potential failure modes, failure effects and causes of failure are identified. Engaging in a systematic method of studying failure can improve future outcomes. The severity, occurrence and probability of detection of a failure mode are used to prioritize which failure modes are most critical. Methodology is introduced for dealing with the effects of failure. The Design FMEA link to manufacturing is explained and amplified in terms of downstream Process FMEA. This course is based on "learning by doing" with interactive, in-class Design and Process FMEA generation and analysis in a lively team environment. This course will also detail relevant portions of the SAE Aerospace Recommended Practice for FMEA, ARP 5580 which is included in the course materials.

KEY

CERTIFICATE PROGRAM ACTAR APPROVED SEMINARS WEBINARS

Learning Objectives

By attending this seminar, you will be able to:
- List the benefits, requirements and objectives of an FMEA (both Product Design & Process)
- Explain the steps and methodology used to analyze a Design or Process FMEA
- Demonstrate the application of a variety of tools utilized in conjunction with performing an FMEA
- Identify corrective actions or controls and their importance in minimizing or preventing failure occurrence
- Interpret the objectives of the SAE Aerospace Recommended Practice for FMEA, ARP5580

Who Should Attend

This seminar is designed for the design engineer, process assurance engineer, reliability engineer, test engineer, quality engineer, development engineer, logistics/support engineer, manufacturing engineer and their management or anyone responsible for the design and development of design or manufacturing, assembly or service processes in the completion of a Design or Process FMEA. Attendees should possess a basic understanding of the design principles/process and manufacturing/assembly process.

Seminar Content

DAY ONE
- Introduction and Overview
  - Definition
  - Requirements for an FMEA (both Design & Process) - Who drives the requirements?
  - FMEA detail
  - Design and Process FMEA similarities and differences--performing and FMEA
  - Prerequisites
  - Basic analysis methodology -- approach; sequence
  - Prioritization of failure modes
  - Typical forms used: examples and recommendations
- Other Quality Tools to Aid in FMEA Development
  - Pareto chart
  - Fishbone diagram
  - Design review
  - Checklists
  - Lessons learned
  - Design of Experiments (DOE)
  - Statistical process Control (SPC)
  - Fault Tree Analysis(FTA)
  - Monte Carlo simulation
- Design FMEA: Class Exercise
  - What's the requirement?
  - Forming the team
  - Process flow
  - Brainstorm design failure modes
  - Use FMEA form to document failure modes, severity, occurrence, detection
  - Prioritize failure modes
  - Work corrective actions
  - How good are these corrective actions?
  - Redo prioritization to compare to requirement
  - Modify product based on analysis, for objective testing

DAY TWO
- Complete Design FMEA exercise (continued)
- Process FMEA: Class Exercise
  - What's the requirement?
  - Forming the team
  - Process flow/Value Stream map
  - Brainstorm process failure modes
  - Use FMEA form to document failure modes, severity, occurrence, detection
  - Prioritize failure modes
  - Work corrective actions
  - How good are these corrective actions?
  - Redo prioritization to compare to requirement
  - Control Plan development
  - Modify product based on analysis, for objective testing
- FMEA software overview
- FMEA and Product Liability

Instructor: Jim Breneman

Jim Breneman is currently a Statistical and Reliability consultant and instructor in the Mathematics Department at the Tri-County Technical College (South Carolina). Mr. Breneman has an extensive background in reliability, as both a P&W Fellow in Reliability Statistics and Risk Analysis, and an SAE Fellow. He has presented papers on reliability topics at various conferences. Mr. Breneman holds a B.S. in Mathematics from the University of North Carolina (Chapel Hill) and an M.S. in Applied Mathematics/Statistics from N.C State University.

Registration Information:
Course I.D. C0939
Fees: $1,225; **SAE Members – Classic:** $1,103
Premium: $1,041; **Elite:** $980
1.3 CEUs

Finite Element Analysis for Design Engineers - Hands-on FEA Workshop

Duration – 2 Days

For additional seminar information and to view upcoming open enrollment dates, visit: **www.sae.org/pdevent/93006**

The Finite Element Analysis (FEA) has been widely implemented by automotive companies and is now used by design engineers as a design tool during the product development process. Design engineers analyze their own designs while they are still in the form of easily modifiable CAD models to allow for quick turnaround times and to ensure prompt implementation of analysis results in the design process. When used properly, the FEA becomes a tremendous productivity tool helping design engineers reduce product development time and cost. On the contrary, misapplication of FEA may lead to erroneous design decisions, which are very expensive to correct later in the design process.

This seminar provides design engineers with skills necessary for proper use of FEA in the design process and to ensure that this powerful tool is implemented in the most efficient and productive way.

The seminar offers hands-on exercises focusing on the analysis of FEA errors and proper modeling techniques. Attendees study different types of analyses typically performed by design engineers, discuss common misconceptions and traps in the FEA and review Implementation of Management of FEA in the design environment. The seminar provides opportunities to discuss and exchange FEA experiences. The seminar layout allows for some customization so problems of particular interest to students can be discussed in class.

All topics are illustrated by hands-on examples using FEA software SolidWorks Simulation. However, acquired skills are not software specific and no prior exposure to any FEA software is required.

The SAE book, *"Finite Element Analysis for Design Engineers,"* by Paul Kurowski is included in the course materials.

Learning Objectives

By attending the seminar, you will be able to:
- Select preferable modeling approaches
- Analyze errors inherent to FEA results
- Identify FEA advantages and shortcomings
- Avoid mistakes and pitfalls in FEA

- Produce reliable results on time
- Request FEA project and use FEA results
- Provide effective FEA project management
- Ensure quality and cost-effectiveness of FEA projects

Who Should Attend

Mechanical engineers in research and development, designing or project management that wish to upgrade their skills in FEA will benefit by attending this seminar. The seminar also addresses the needs of managers in charge of FEA projects performed by design engineers.

Prerequisites

Attendees should have background in mechanical or industrial engineering. No previous exposure to FEA is required.

Seminar Content

DAY ONE
- Basic concepts in the FEA and their influence on FEA accuracy
- Origins and types of FEA errors
- Influence of mesh on quality of results
- Types of finite elements
- Types of boundary conditions
- Useful modeling techniques
- Linear static analysis
- Modal analysis

DAY TWO
- Thermal analysis
- Buckling analysis
- Nonlinear analysis--nonlinear geometry; nonlinear material; contact stresses
- Interfacing between CAD and FEA
- FEA implementation
- FEA project management
- FEA traps and misconceptions
- FEA assessments

Instructor: Paul Kurowski

Dr. Paul Kurowski is a professor in the Department of Mechanical and Materials Engineering at the University of Western Ontario in London, Ontario. His teaching experience includes finite element analysis, machine design, mechanics of materials, kinematics and dynamics of machines, and product development. He is also the President of Design Generator Inc., a consulting firm specializing in product development, design analysis and training in Computer Aided Engineering methods. Dr. Kurowski has published multiple technical papers and taught professional development seminars for SAE International, the American Society of Mechanical Engineers, the Association of Professional Engineers of Ontario, the Parametric Technology Corp. (PTC), Rand Worldwide, SolidWorks Corp. and other companies and professional organizations. He contributes regularly to several engineering publications focusing on the implementation of CAE methods into the product development process. He is a member of SAE International and the Association of Professional Engineers of Ontario. Dr. Kurowski obtained his M.Sc. and Ph.D. in Applied Mechanics from Warsaw Technical University and completed postdoctoral work at Kyoto University.

Registration Information:
Course I.D.# 93006
Fees: $1,325; **SAE Members – Classic:** $1,193
Premium: $1,126; **Elite:** $1,060
1.3 CEUs

Geometric Dimensioning & Tolerancing - Level I

Duration – 3 Days

For additional seminar information and to view upcoming open enrollment dates, visit: **www.sae.org/pdevent/86020**

Save time and money, while increasing quality and productivity by mastering this important and internationally-accepted engineering communication system. Geometric Dimensioning and Tolerancing (GD&T) is based on ISO standards and the ASME Y14.5M-1994 Dimensioning and Tolerancing Standard. Seminar attendees will have a unique opportunity to meet one-on-one with the instructor, with time to discuss problem drawings in a focused setting, and will receive a copy of the ASME Y14.5M-1994 Dimensioning and Tolerancing Standard and handout material specially prepared for this program.

Attendees are encouraged to bring problem drawings as they will have several opportunities during the workshop to meet with the instructor individually.

Learning Objectives

By attending this seminar, you will be able to:
- Learn effective use of the standardized accepted symbolic design/engineering language
- Enhance your ability to communicate and interpret specifications on engineering drawings and to replace instructions that are often misunderstood
- Improve communications and relations among design, engineering, manufacturing, and quality control personnel
- Eliminate translation errors with international affiliates
- Save time, reduce costs, and increase productivity

Who Should Attend

This workshop is designed for those who are involved in any area of engineering, drafting, design, quality control, inspection, tool or gage design, machining, or estimating where communication by engineering drawings is involved. The workshop is designed to teach the beginner the fundamentals of the system while giving the experienced user a better understanding of the more difficult applications.

Seminar Content

- Introduction to Geometric Dimensioning & Tolerancing & Geo-Metrics - Background, origin; basis ASME Y14.5M-1994, ISO standards; Why use it? What is it?; geometric characters; symbols; advantages; limits of size Rule 1; MMC, RFS, LMC; terms; definitions; application; tolerance zones; “feature” description; symbol methodology
- Form Tolerances - Flatness, straightness, circularity, cylindricity; definitions; application; when and how to apply; relationship to “size”; virtual condition; evaluation & verification; individual vs. related features; Rule 3
- Orientation Tolerances - Perpendicularity, parallelism, angularity; definitions; related features; datums-surfaces, plans, axes, cylinders; MMC & RFS; relationship to position controls; virtual condition; application; evaluation & verification; functional principles
- Profile Tolerances - Profile of a surface & profile of a line; definitions; relationship to size; general rules; when to apply; datum relationship; total surface control vs. line element control; application; evaluation & verification principles
- Runout Tolerances - Circular & total runout; definitions; differences & similarities (circular & total runout); when to apply; coaxial features; datums; double datums; datum precedence; comparison with position & concentricity; FIM; application; evaluation & verification principles
- Location Tolerances - Position; concentricity; symmetry; definitions

KEY
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- Position Tolerances-Cylindrical features - Hole & Pin patterns; Position tolerance theory; comparison between position & coordinate tolerances; advantages; conversion-position vs. coordinate tolerances; the "bonus" tolerance; mating parts-calculations; applications; use of MMC, RFS, LMC; relationship to datums; datum precedence & methodology; functional gaging; Rule 2; composite position tolerancing; composite position tolerancing with secondary datum; selection of datums (features); "Size" datums; paper gaging; open setup verification; projected tolerance zone; datum, virtual condition rule
- Position Tolerances-Non-Cylindrical Features - Application, MMC, RFS; symmetrical features; calculations; relationship to datums (non-cylindrical); evaluation & verification principles; functional gaging
- Position Tolerances-Coaxial Features - Application, MMC, RFS; coaxial features; calculations; relationship to datums (coaxial/cylindrical); evaluation & verification principles; functional gaging
- Concentricity - Definition; comparison to runout & position; evaluation & verification principles; application
- Datums - Kinds, definitions; datum features; selection; datum reference frames; datum precedence; datum targets; extended datum principles; precision
- Current Status of National Standard - ASME Y14.5
- Question & Answer Session
- Problem Solving Session
- Discussion Session

Instructor: Barry W. Heathcotte

Barry W. Heathcotte is an individual consultant specializing in training and consulting services on the subject of Geometric Dimensioning and Tolerancing. He has more than 30 years experience in the subject matter and has been a lecturer at both public and in-plant seminars and training programs. Mr. Heathcotte has more than 40 years of industrial experience, is a Certified Manufacturing Engineer, a senior member of SME, and a member of ASME. He has been an active member of the ASME Y14.5 Committee on Dimensioning and Tolerancing since 1982 and is a nationally-recognized expert on its application and interpretation.

Registration Information:
Course I.D.# 86020
Fees: $1,745; **SAE Members – Classic:** $1,571
Premium: $1,483; **Elite:** $1,396
2.0 CEUs

Geometric Dimensioning & Tolerancing - Level II

Duration – 3 Days

For additional seminar information and to view upcoming open enrollment dates, visit: **www.sae.org/pdevent/92048**

This is not an introductory course. This course is designed to give practitioners of GD&T a more thorough knowledge of the concepts of the system. Misunderstandings and areas of weakness in your knowledge base will be identified through the use of a proficiency examination. Based on the results of the exam, the class is modified to suit the needs of the participants. Class time is then devoted to clarifying and expanding on concepts and advancing your knowledge base. Emphasis is on thinking about parts in the manner that GD&T provides for you. As a result, attendees will gain a better understanding of the function of their manufactured parts and how it relates to these concepts. You are encouraged to bring with you ASSEMBLY DRAWINGS AND SUPPORTING PIECE PART AND DETAIL DRAWINGS. Drawings will be used at the end of the class to help solidify the knowledge gained. At the end of class, groups will view and analyze drawings to determine proper datums, necessary relationships and correct methods of control. Use of submitted drawings will be dependent upon the instructor's determination of relevance and usefulness for discussion.

The following textbooks and study materials will be provided: Geo-Metrics III, Pocket Guide, ASME Y14.5M-1994 Dimensioning & Tolerancing standard, workbooks and answerbooks.

Learning Objectives

By attending this seminar, you will:
- identify any areas of weakness or misunderstandings you may have in interpreting or applying the GD&T system
- clarify and expand your knowledge base of GD&T
- view and analyze actual drawings to apply what you've learned
- receive valuable textbooks, standards, and reference materials that can be used for future day-to-day reference

Who Should Attend

If you apply or interpret GD&T and have had training in the subject, this course will give you a better understanding of the thought processes necessary to do your job. To receive maximum benefit from this course, you should...
- Be committed to the use of GD&T and be aware of its value and benefits
- Have an understanding of the fundamental principles of the system

Prerequisites

This is not an introductory course. Participants should have prior training (minimum of 16 hours of formal classroom training recommended) and experience in GD&T.

Seminar Content

DAY ONE
- GD&T Exam
  - Pinpoints attendees' needs
  - Exam results overview
- Review of Basics
  - MMC, RFS, LMC
  - Limits of size
  - Datums
  - General rules
  - Virtual condition
- Form Tolerances
  - Straightness
  - Relationship to size
  - Virtual condition
  - Evaluation & verification
- Datums
  - Size features as secondary & tertiary datums
  - Understanding orientation datums
  - Equalizing datums
  - Manufacturing datums vs. functional datums
  - Swapping datums
  - Understanding datum shift
  - Size datums; non-size datums
  - Datum features
  - Selection of datums
  - Extended principles
- Orientation Tolerances
  - Perpendicularity; angularity; parallelism
  - Datum relationship
  - Relationship to size
  - Virtual condition
  - Functional gaging
  - Evaluation & verification

DAY TWO
- Profile Tolerances
  - Co-planarity
  - Composite profile
  - Loss of tolerance zone
  - Controlling & locating cones
  - Profile as location control
  - Profile of a surface; profile of a line
  - General rules

  - Datum relationship
  - Evaluation & verification
- Runout Tolerances
  - Circular runout; total runout
  - Datum relationship
  - Comparison with position & concentricity
  - Composite nature
  - Virtual condition
  - Evaluation & verification
- Position Tolerances (Cylindrical Features)
  - Hole and pin patterns
  - Position tolerancing theory
  - Mating parts--calculations; applications
  - Use of MMC, RFS, LMC
  - Projected tolerance zone
  - Relationship to datums, datum precedence and methodology
  - Selection of datums
  - Datum/virtual condition rule
  - Functional gaging and open set-up verification
  - Inspecting with a coordinate measuring machine
  - Paper gaging
- Position Tolerancing (Non-Cylindrical Features)
  - Symmetrical features
  - Mating parts--calculations; applications
  - Use of MMC, RFS, LMC
  - Relationship to datums, datum precedence and methodology
  - Selection of datums
  - Datum/virtual condition rule
  - Functional gaging and open set-up verification
  - Inspecting with a coordinate measuring machine
- Position Tolerancing Extended Principles
  - Different size holes
  - 3-part assemblies
  - Reversible parts
  - Resultant condition
  - Datum shift & the "mother duck"
  - Composite position tolerancing for single patterns
  - Composite position tolerancing for holes in line
  - Using dowels and holes for datums
  - Separate requirements for patterns
  - Paper gaging composite position tolerancing
  - Hole patterns as datums
  - Zero tolerance at MMC
  - Composite position vs. two single segments

DAY THREE
- Concentricity
  - When and how to apply
  - Comparison with runout and position tolerancing
  - Evaluation & verification
- Current Status of National and International Standards
  - ASME Y14.5M
  - ISO
- Evaluations of Company Drawings
  - Exercise on choosing datums
  - Review of current use and interpretation of GD&T on company drawings
  - Review of company drawings with regard to further use of GD&T where warranted

Instructor: Barry W. Heathcotte

Barry W. Heathcotte is an individual consultant specializing in training and consulting services on the subject of Geometric Dimensioning and Tolerancing. He has more than 30 years experience in the subject matter and has been a lecturer at both public and in-plant seminars and training programs. Mr. Heathcotte has more than 40 years of industrial experience, is a Certified Manufacturing Engineer, a senior member of SME, and a member of ASME. He has been an active member of the ASME Y14.5 Committee on Dimensioning and Tolerancing since 1982 and is a nationally-recognized expert on its application and interpretation.

Registration Information:
Course I.D,# 92048
Fees: $1,745; **SAE Members – Classic:** $1,571
Premium: $1,483; **Elite:** $1,396
2.0 CEUs

Reverse Engineering: Technology of Reinvention

Duration – 2 Days

For additional seminar information and to view upcoming open enrollment dates, visit: **www.sae.org/pdevent/C0559**

During the past decade reverse engineering has become a common and acceptable practice utilized by many original equipment manufacturers and suppliers. This course focuses on the application of modern technologies used to decode the design details and manufacturing processes of an existing part in the absence of the original design data. It emphasizes the real-life practice of reverse engineering in the aerospace industry from both scientific and legal points of view. Attendees will learn the applicability and limitations of reverse engineering through case studies and hands-on exercises. Various measurement instruments, ranging from traditional micrometers to computer-aided laser probes, will be compared for their merits and shortcomings. The statistics of dimensional measurements and the acceptable tolerance of variations, with emphasis on industrial standards in real-life practice will be discussed. Material identification, manufacturing process verification and the system compatibility of the subject part to be reverse engineered will be covered in substantial detail. In addition, the materials specifications will be exemplified as useful supporting documents for substantiation data.

Note: Participants should bring a calculator for in-class exercises.

Learning Objectives

By attending this seminar, you will be able to:
- Define the critical elements of reverse engineering
- List the measurements and analyses required to duplicate/reproduce an OEM part by reverse engineering
- Recognize if an OEM part can be duplicated/reproduced by reverse engineering
- Judge if a "duplicated" part will meet the design functionality of the OEM part
- Evaluate the feasibility of a reverse engineering proposal/project
- Describe and implement a process to duplicate/reproduce a part by reverse engineering

Who Should Attend

This seminar is designed to assist individuals in various industries including, but not limited to, automotive, aerospace, off-highway, motorsports and parts brokerage firms. Corporate senior executives, engineering managers, engineers, technicians, government inspectors, sales managers, salespersons, lawyers and legal counselors will find the course relevant and informative.

Prerequisites

Participants should have an undergraduate degree or equivalent experience/knowledge.

KEY
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Seminar Content

DAY ONE
- Introduction
  - Historical background
  - Reverse engineering vs. machine design
  - Three basic requirements: form, fit and function
- Geometrical Form
  - Dimensional measurement
  - Precision instruments of measurement
  - Tolerance
  - Virtual exercise of geometrical modeling
- Material and Process Identification
  - Chemical composition identification
  - Manufacturing process verification
  - Materials specification substantiation
  - Machining process identification
- Data Process and Analysis
  - Statistical analysis
  - Statistical exercise
  - Case study of statistical confidence
  - Reliability

DAY TWO
- Demonstration and Exercise
  - Demonstration of scanning
  - Hands-on exercise of reverse engineering
  - Case study
- Regulations and Certifications
  - Government regulations
  - Industrial standards
  - Certification requirements
- Fit and Function
  - System compatibility
  - Critical performance
  - Vendor substantiation
  - Safety and damage tolerance
- Acceptance and Legality
  - Evolving industry trends
  - Moral and legal issues
  - Examples - legal precedents

Instructor: Wego Wang

Dr. Wang is currently an aerospace engineer in the Engine Certification Office of the Federal Aviation Administration, where he serves as the focal point for Parts Manufacturer Approval. Dr. Wang taught at Northeastern University and is currently an adjunct faculty at Boston University and the University of Massachusetts - Lowell. He received many awards, commendations and recognitions from the Army Research Laboratory, the FAA and other institutions. Dr. Wang authored or co-authored over 40 technical/professional articles, and presented lectures/reports at numerous seminars/conferences. Active with professional societies, he is on the executive committee of ASM International Boston Chapter and was the 2005-06 Chairman of the Chapter. He also served on the executive committee of TMS Boston Section, where he was president from 1993-95. Dr. Wang has a B.S. in Mechanical Engineering from National Cheng - Kung University, a M.S. in Mechanical Engineering from National Taiwan University, and a M.S. and Sc.D. in Materials Science and Engineering from Massachusetts Institute of Technology.

Registration Information:
Course I.D.# C0559
Fees: $1,225; **SAE Members – Classic:** $1,103
Premium: $1,041; **Elite:** $980
1.3 CEUs

Statistical Tolerance Design

Duration – 1 Day

For additional seminar information and to view upcoming open enrollment dates, visit: **www.sae.org/pdevent/88033**

This seminar will include a review of statistical theory and present statistical methods, which are used to better select and/or analyze Tolerance Stack-ups. The Probability (RMS) Method, the Monte Carlo Simulation Technique and tolerance optimization techniques will be discussed along with guidelines on which method(s) to use in given situations. Attendees will also view a demonstration of a microcomputer Monte Carlo Simulation program that analyzes the effects of form and assembly variation on the quality of a finished product. This seminar will provide an overview of Design of Experiments (DOE) methods, which enable effective analysis of critical product dimensions and tolerances. Note: Participants should bring a scientific calculator for several in-class exercises.

Learning Objectives

By attending in this seminar, you will be able to:
- Apply worst case, root-mean-square, and Monte Carlo simulation methods for the allocation of analysis of simple-to-intermediate complexity tolerancing schemes
- Use the "Risk of Misassembly" approach for tolerance allocation, and the "Main Effect" approach for determining dimensional variables tolerance which exhibit the greatest impact on build variation
- Understand and be exposed to various computer tools which can greatly improve their statistical tolerancing efforts, given the intricacies of GD&T, plus-minus tolerancing, and various datum schemes

Who Should Attend

This seminar is intended for engineers and educators who would like to have a good working knowledge of applying statistics to product design in order to better predict and improve product quality.

Prerequisites

An engineering undergraduate degree in any discipline would be beneficial.

Seminar Content

- Review of Tolerancing Methods, Tolerance Stack-Ups and the Relationship between Tolerancing and Quality. A High-Level Overview of Geometric Dimensioning & Tolerancing (GD&T) and Process Capability Measurement is Provided
- Tolerance Synthesis (Allocation) Versus Tolerance Analysis
- Overview of the Worst Case (non-statistical) Tolerancing Method for Comparison with Statistical Tolerancing Results
- Probability & Statistics Concepts Required for Statistical Tolerancing Methods
- Tolerance Allocation Based on "Risk of Misassembly"
- Statistical Tolerancing Using the Root-Mean-Square (RMS) Method
  - With bilateral tolerances
  - With unilateral and/or asymmetrical tolerances
  - In 2-D and 3-D applications
  - Participant exercises
- Statistical Tolerancing Using Monte Carlo Simulation
  - Performing Monte Carlo Analysis by hand
  - Demonstrations of computer software for Monte Carlo Simulation and analysis (VSA-2D, VSA-3D and others, if time permits)
- Analyzing Part Tolerances using Main Effect and Sensitivity Analysis Methods -- Methods for Determining the Contribution of Process Variables to Overall Process Variation. A Brief Description of Partial and Full-Factorial Analysis is Also Provided
- Overview of Design of Experiments (DOE) and Tolerance Optimization Techniques -- Their Benefits in Effective Tolerancing of Parts and Assemblies
- Tolerance Management Program Guidelines -- For the Benefit of Participants Interested in Establishing a Comprehensive Quality Assurance Program in Their Organization

Instructor: Kevin Zielinski

Kevin Zielinski currently owns and operates Red Cedar Media LLC, a training and corporate communications consulting, design, development and delivery company based in Michigan. Previously, Kevin was Senior Applications Specialist for EDS (including General Motors/EDS and Hewlett Packard/EDS) specializing in technical training delivery, training consulting, courseware design and development, and e-Learning. He has designed, developed and delivered over 40 lecture- and web-based courses attended by General Motors and EDS employees worldwide. Mr. Zielinski has also served as Adjunct Professor for the Wayne State University College of Engineering and WSU/Focus:Hope for many years. His areas of expertise include: e-Learning design and development, Quality Tools and Methods (Design of Six Sigma, Robust Engineering, Design of Experiments (DOE), Statistical Tolerancing and GD&T); Design for Manufacturing and Assembly (DFMA); Engineering Economics; and Plant Floor Throughput Improvement. He has been an instructor for SAE Professional Development since 1990, and is a recipient of SAE's Forest R. McFarland Award (April 2005). He holds a bachelor's and master's degree in engineering from Wayne State University.

Registration Information:
Course I.D.# 88033
Fees: $775; **SAE Members – Classic:** $698
Premium: $659; **Elite:** $620
0.7 CEUs

Vibration Analysis using FEA: A Hands-on Workshop

Duration – 2 Days

For additional seminar information and to view upcoming open enrollment dates, visit: **www.sae.org/pdevent/C0830**

FEA has been used by engineers as a design tool in new product development since the early 1990's. Until recently, most FEA applications have been limited to static analysis due to the cost and complexity of advanced types of analyses. Progress in the commercial FEA software and in computing hardware has now made it practical to use advanced types as an everyday design tool of design engineers. In addition, competitive pressures and quality requirements demand a more in-depth understanding of product behavior under real life loading conditions. This seminar introduces one of the advanced types of FEA: vibration analysis. By considering time dependent loads and inertial effects, vibration analysis allows for a more in-depth product simulation thus reducing product development cost and time. The course reviews basic concepts of vibration analysis and illustrates how they are implemented in FEA to simulate product behavior. The most common types of vibration analysis such as modal, time response, frequency response and random vibrations are covered. Participants will have the opportunity to practice skills learned utilizing the commercial FEA software SolidWorks Simulation.

Learning Objectives

By attending this seminar, you will be able to:
- Evaluate the importance of dynamic effects in product simulation
- Analyze inertial and damping effects in structural response
- Use vibration analysis as a design tool
- Perform time response, frequency response and random vibration analyses
- Apply proper FEA modeling techniques to model system dynamic

Who Should Attend

The seminar will be of interest to any design engineer who already uses Finite Element Analysis (FEA) as a design tool and would like to explore if and how vibration analysis with FEA may benefit the design process. It builds on participants' experience with static FEA and on knowledge of mechanical vibrations common to any mechanical engineer.

Prerequisites

Participants should have a degree in mechanical engineering and have some experience with FEA either by participating in the SAE seminar ID# 93006 - "Finite Element Analysis for Design Engineers" or through equivalent work experience.

Seminar Content

DAY ONE
- Structure vs. Mechanism
- Fundamental Assumptions in the FEA
- Verification and Validation of FEA Results
- Modal Analysis
  - Convergence of frequencies
  - Rigid body modes
  - Properties of lower and higher modes
  - Eigenvalues and eigenvectors
  - Modal superposition method
  - Modes separation
  - Modeling techniques in modal analysis
- Time Response Analysis
  - Time depended load
  - Impulse load
  - Static vs. dynamic response
  - Time response of a single degree of freedom oscillator

DAY TWO
- Frequency Response Analysis
  - Steady state harmonic response
  - Force and base excitation
  - Resonance
  - Modal damping
  - Frequency response of two degrees of freedom oscillator
- Random Vibration
  - Acceleration power spectral density
  - Interpretation of random vibration results
- Linear vs. Non-linear Vibration Analysis
- Modeling Considerations in Vibration Analysis

Instructor: Paul Kurowski

Dr. Paul Kurowski is a professor in the Department of Mechanical and Materials Engineering at the University of Western Ontario in London, Ontario. His teaching experience includes finite element analysis, machine design, mechanics of materials, kinematics and dynamics of machines, and product development. He is also the President of Design Generator Inc., a consulting firm specializing in product development, design analysis and training in Computer Aided Engineering methods. Dr. Kurowski has published multiple technical papers and taught professional development seminars for SAE International, the American Society of Mechanical Engineers, the Association of Professional Engineers of Ontario, the Parametric Technology Corp. (PTC), Rand Worldwide, SolidWorks Corp. and other companies and professional organizations. He contributes regularly to several engineering publications focusing on the implementation of CAE methods into the product development process. He is a member of SAE International and the Association of Professional Engineers of Ontario. Dr. Kurowski obtained his M.Sc. and Ph.D. in Applied Mechanics from Warsaw Technical University and completed postdoctoral work at Kyoto University.

Registration Information:
Course I.D.# C0830
Fees: $1,265; **SAE Members – Classic:** $1,139
Premium: $1,075; **Elite:** $1,012
1.3 CEUs

Thermodynamics of Gas Turbine Engines

Duration – 2 Days

For additional seminar information and to view upcoming open enrollment dates, visit: **www.sae.org/pdevent/C0118**

This seminar explores the principles of conversion of thermal energy to mechanical work output, the basics of thermodynamics and fluid flow, and the application of the First Law of Thermodynamics to systems with mass flow processes. This foundation is necessary to analyze the energy transfer processes in the major components of a gas turbine plant; namely, compressor, combustion chamber, turbine, and heat recovery system. Hands-on problem solving will reinforce the learning experience. In addition, this seminar investigates the various causes of less than ideal performance of a gas turbine plant. Calculations will be done to permit evaluation and analysis of plant performance when parameters are specified. The techniques of staging and intercooling, designed to improve performance, will also be explored. Hardware components of a typical gas turbine plant and commercial applications of gas turbines will be reviewed.

Learning Objectives

Upon completion of this seminar, the attendee will be able to:

- Define Thermodynamic Properties Of Ideal And Real Gases, Heat, and Work
- Apply the First Law of Thermodynamics to Closed and Open Systems
- Perform Calculations to Determine Entropy Changes
- List the Components of a Gas Turbine Power Plant
- Define Thermal Efficiency of the Gas Turbine Power Plant and Isentropic Efficiencies of the Compressor and the Turbine
- Recognize the Need for Staging, Intercooling, Reheating and Regeneration
- List the Causes for the Departure from the Ideal Performance of a Gas Turbine Power Plant
- Calculate the Performance of a Gas Turbine Power Plant with Staging and Intercooling Under Ideal and Real Life Conditions
- Describe the Recent Advances in Gas Turbine Technology

Who Should Attend

Design, mechanical, or facilities engineers with an interest in gas turbine engines and plants; engineers interested in cogeneration; stationary generator-set manufacturers and users; public and private sector service providers, including hospital and municipal authorities.

Prerequisites

Participants should have an undergraduate engineering degree or equivalent.

Seminar Content

DAY ONE

- Thermodynamic Properties of Substances
- Ideal and Real Gases
- Closed and Open Systems
- Forms of Energy: Work and Heat
- The First Law of Thermodynamics and Internal Energy
- The Second Law of Thermodynamics and Entropy
- Hands-On In-Class Problem Solving
- The Carnot Cycle

DAY TWO

- Energy Conversion Devices
- The Gas Turbine Plant
- The Air Standard Brayton Cycle and Its Thermal Efficiency
- Hands-On In-Class Problem Solving
- Isentropic Efficiencies of the Compressor and the Turbine
- Ideal and Actual Performances
- Staging Brayton Cycle with Intercooling and Reheat
- Regeneration
- Hands-On In-Class Problem Solving
- Advances in the Gas Turbine Technology and Applications

Instructor: B.V. Karlekar

Dr. Karlekar holds a B.E. in Mechanical Engineering from the Univ. of Baroda, India, an M.S. and a Ph.D. in Mechanical Engineering from the Univ. of Illinois - Urbana. He served as Head of the Mechanical Engineering Department at Rochester Institute of Technology. During his tenure there, Dr. Karlekar was awarded RIT's Eisenhardt Outstanding Teacher Award, published numerous papers and authored three textbooks. Later, he was appointed Director of the Center for Integrated Manufacturing Systems. Dr. Karlekar is an ASME Fellow and continues to take active interest in Mechanical Engineering students at RIT by assisting them in the Engineering Learning Center.

Registration Information:
Course I.D.# C0118
Fees: $1,225; **SAE Members – Classic:** $1,103
Premium: $1,041; **Elite:** $980
1.3 CEUs

Microbial Contamination in Aviation Fuel and Aircraft Fuel Systems

Duration – 1 Day

For additional seminar information and to view upcoming open enrollment dates, visit: **www.sae.org/pdevent/C0728**

Microbial contamination in aviation fuel creates biomats that clog filters and scavenge systems, coat fuel quality indicator systems (FQIS) probes, and lead to structural corrosion, impacting the operational and economical aspects of turbine powered fixed wing and rotary wing aircraft. From inaccurate fuel level readings to aborted take-offs and air interrupts, microorganisms can wreak havoc on the entire aircraft and the system operations. Attendees will learn how microorganisms enter and survive in the fuel distribution and storage network, and how a routine surveillance program can manage risk and mitigate lost profits. Students will have the opportunity to experience hands-on techniques to detect and remediate contamination in aviation fuel systems.

Learning Objectives

By attending this seminar, you will be able to:

- Describe the impact of microorganisms on aircraft fuel systems
- Explain how microorganisms survive in an aviation fuel environment
- Determine how microorganisms enter the fuel storage and distribution system
- Detect and remediate microbially contaminated fuel systems
- Improve the overall operational reliability of aircraft and reduce maintenance costs

Who Should Attend

This seminar is appropriate for aircraft fuel systems design engineers, aviation fuel quality managers in manufacturing, storage and distribution facilities, aircraft fuel quality managers, and aircraft maintenance technicians.

Prerequisites

Attendees should have a basic understanding of fuels and fuel systems.

Seminar Content

- Microorganisms
  - Brief overview of the operational and economic impact of microorganisms to the aviation industry
  - Regulatory, FAA Flight Standards Information Bulletin for Airworthiness (FSAW) FSAW 05-08A "Air Carrier Implementation of Inspections for Fuel Microbial Contamination"
  - Brief description of microorganisms related to aviation fuel
  - Requirements for microorganisms to survive in a fuel storage system
  - Aircraft fuel system water scavenger maintenance and periodic aircraft fuel tank sump draining
- Aviation Fuel Storage and Distribution
  - Entry and movement of microorganisms throughout the aviation fuel storage and distribution network
- The Impact of Microorganisms on Aircraft
- Detection of Microorganisms
  - Types of detection equipment and procedures
  - Practicum - test methods and equipment -- Culture test; Immuno assay test; Bioluminescence test
- Remediation of Microorganisms
  - Microbial pesticides approved for use in aviation fuel
  - USEPA regulations governing the sale of microbial pesticides in the U.S.
  - Characteristics of an efficacious microbial pesticide
  - Methods for treating storage and distribution systems
  - Industry practice for introducing a microbial pesticide into aircraft
- Surveillance Program
  - Benefits of a routine surveillance program
  - Developing a surveillance program

Instructors Biography

Mr. English is currently Vice President & Technical Director for Fuel Quality Services, Inc. where he oversees all aspects directly related to the research, development, and deployment of chemicals, antimicrobials and detection equipment for use in the various stages of the petroleum and biomass fuels industry from the refinery to the end user. He is nationally recognized for his knowledge and expertise in the area of microbial contamination of fuels, alternative fuels, and materials compatibility and has been an invited speaker for such organizations as the EPA, FAA, CALCUPA, NEIWPCC, PEI, NISTM, and SAE, DuPont, and Biofuels Americas. Mr. English is also an active member of numerous professional organizations including SAE International®, IASH, IATA, and ASTM. He has a B.S. in Chemistry from the University of Florida and two years post-baccalaureate work from the University of Miami.

Mr. Chesneau is the President of Fuel Quality Services, Inc. A recognized expert on fuel-related issues, he has over thirty years of experience in fuel additives, distillate fuel problems, fuel filtration, and tank remediation. Additionally, Mr. Chesneau has extensive knowledge and field experience in the area of microbial contamination and detection. He is an active member of other professional organizations including SAE International®, IATA, and ASTM. In addition to his committee and working group activities, Mr. Chesneau has authored and co-authored many articles on the subject of fuel storage and handling that have been published in various trade magazines. Mr. Chesneau served as a commissioned officer in the US Army and holds a B.S. degree from the University of Florida.

Registration Information:
Course I.D.# C0728
Fees: $725; **SAE Members – Classic:** $653
Premium: $616; **Elite:** $580
0.7 CEUs

Aerospace Program Management - It's More than Scheduling and Delivery

Duration – 3 Days

For additional seminar information and to view upcoming open enrollment dates, visit: **www.sae.org/pdevent/C0818**

Effective and efficient management of today's complex and integrated programs requires both the refinement of interpersonal and basic leadership skills as well as the application of appropriate technologies and tools. This seminar is intended to introduce basic program management skills and techniques to first-line and mid-level leaders to help them comfortably and confidently assume their role and to aid in assuring program success. Areas of special concentration will include: role of project management, communication, interpersonal skills, schedule management, interfacing with other units, Task Scoping (Estimating, Pricing, Financial Measures, etc.), project management software use, compliance reporting, risk management and more. This seminar will include lecture, dialog, and case-study approaches. Active participation of the class attendees will ensure a dynamic baseline for learning and honing valuable skills.

Learning Objectives

By attending this seminar, you will be able to:

- Communicate more effectively in all media - verbal, written, and electronic modes
- Refine interpersonal skills as they relate to dealing with diverse personal perspectives, attitudes, and motivational techniques
- Develop and utilize task schedules
- Demonstrate effective management of all resources (people, tools, and budgets)
- Apply techniques for scoping programs/projects (resource needs, schedules, level of tasking, etc.) and effectively monitor and measure progress
- Identify critical milestone events and how to develop alternate schedule recovery plans
- Utilize basic project management tools and techniques more effectively

Who Should Attend

This course is designed for current and prospective Program/Project Managers with a level of experience ranging from in-training to mid-level program management leadership.

Prerequisites

Practical understanding of desktop software applications is useful as well as general knowledge of basic financial principles.

Seminar Content

DAY ONE

- Introduction to Program/Project Management
- Clarifying and Giving Identity to Tasks
  - Who are the stakeholders? What do they want?
  - What are the resource allocations? (budgets, tools, facilities, personnel)
  - What constitutes program/project success?
- Communication Skills Essentials
  - Elements of effective presentations (verbal, e-mail, internet)
  - Appreciation of differing perspectives and how to integrate them
  - Interpersonal skills
- Interfacing with Other Units
  - Use of integrator personnel
  - Importance of shared goals as well as shared responsibilities

DAY TWO

- Establishing and Developing of Performance Schedules
  - Ensuring dependencies are identified and commitments are defined
  - Determining critical milestones and potential impacts
  - Introduction to use of commercial software tools
- Creating Meaningful Performance Metrics and Monitoring Techniques
  - The "critical life signs" of a program/project (cost, schedule, quality)
  - Role of program/project integrator and methods of in-process performance monitoring
  - Keeping all stakeholders informed and satisfied
- Compliance Reporting, Test Plans, and Contingencies
  - Regulatory documents and reports
  - Test plans and configuration control
  - FAA certification
  - Use of "critical life signs", milestones, and monitoring
  - Notification of problems and re-plans to stakeholders
  - Refining the art of asking for and receiving help

DAY THREE

- Managing the Individual Components of the Program/Project
  - Financial aspects (pricing, ROI, ROIC, etc.)
  - Marketing coordination, warranties, and after-market support
  - Using metrics to correct "critical life sign" deficiencies
  - Risk - assessment, abatement, and management
- Motivation and Rewards
  - Effective use of non-financial rewards for team members
  - Ensuring full participation and best contribution from each team member
  - Valuing others and letting them know it
- Workshop
  - Using program/project management techniques and tools, perform trial tasks as assigned
  - Discuss and critique workshop tasks
- Conclusion
  - Importance of "unlearned" leadership attributes (integrity, honesty, people sensitivity)
  - Business and personal ethics

Instructor: Drexel L. Rutledge

Mr. Rutledge is currently an Aerospace Consultant with Integrity Engineering, Inc. where he works with several aerospace companies in the area of Product Support and Sustainment. His principal areas of expertise are in project management, technical information development and delivery, and proposal development activities. Most recently, his expertise in performance based logistics and international support applications have been sought out by several DFW area providers. Prior to joining Integrity Engineering, Inc, Mr. Rutledge was employed by Lockheed Martin Aeronautics Company as the Systems Engineering Director responsible for developing and delivering the technical information needed to operate and maintain all aircraft manufactured or supported by Lockheed Martin Aeronautics by all US and foreign operators. Mr. Rutledge is a Certified Professional Manager, a Past Chairman of the Product Support Executive Board of Directors of the Aerospace Industries Association, a Past President and Chairman of the Board of Directors of the General Dynamics Management Association, a member of the Air Force Association, and an Honorary Lifetime Member of the International Office and Professional Employees Industrial Union. He has served as the Industry Representative and co-chair of multiple Department of Defense and Industry project teams including the 2003 Logistics Transformation Initiative. He is the recipient of the 2006 Leonard Ross Memorial Award for Outstanding Contributions in the field of Logistics. Mr. Rutledge has a Bachelor of Science in Business Management as well as a Master of Business Administration from LeTourneau University in Texas.

Registration Information:
Course I.D.# C0818
Fees: $1,545; **SAE Members – Classic:** $1,391
Premium: $1,313; **Elite:** $1,236
2.0 CEUs

Patent Litigation in the U.S.: What You Need to Know Webinar

Two, two-hour sessions

For additional seminar information and to view upcoming open enrollment dates, visit: **www.sae.org/pdevent/WB0940**

In today's economic environment, patents have become an increasingly important asset for both individuals and corporations. More and more, individuals and corporations, including those in the automotive and aerospace industries, are recognizing that revenue can be generated from their patent rights, whether those rights consist of a single patent, a family of patents or an entire portfolio. Indeed, some companies do not make or sell products; their entire revenue is derived from the licensing of their patents. Suffice it to say, licensing revenue has become a significant source of value in the global intellectual property economy. This webinar will tell you what you need to know about U.S. patent litigation and will provide in-depth insights into the practical realities of patent disputes in the U.S. You will learn what's involved in a patent case, including the issues that the patent owner has to prove, e.g. infringement, and the issues the accused infringer has to prove, e.g., invalidity. You will increase your awareness of the role of the judge and the jury in patent cases and you will hear about the increasing use of alternative dispute resolution mechanisms, such as mediation, to resolve patent disputes. Among other topics, this course also will increase your appreciation for the time it typically takes to go from the filing of a case to trial, and the fees and expenses associated with the case.

Learning Objectives

By connecting with this webinar, you will be able to:
- Obtain an overview of U.S. patent litigation
- Explain the basic legal principles for liability and damages in patent cases
- Gain insights into how patent disputes are resolved
- Predict the fees and expenses associated with bringing and/or defending a patent case in the U.S.
- Anticipate the scope of discovery in, and/or business disruption arising from, a U.S. patent case
- Peek into the future of potential patent law reform

Who Should Attend

This course is geared toward executives, in-house counsel, in-house patent agents, and senior managers across industries, such as automotive and aerospace. Participants may be both U.S. and non-U.S. -- anyone who needs help in understanding what to expect and what the realities are should they become involved in U.S. patent litigation.

Webinar Content

Session 1
- Overview of Patent Litigation
  - Issues the patent-owner has to prove
  - Issue the accused infringer has to prove
- What is the Scope of Discovery?
  - Documents, including e-documents
  - Depositions
  - Third parties (e.g. customers, suppliers)
  - Confidentiality of discovery materials
- Who Decides Liability and Damages?
  - Jury
  - Judge
  - Mediator/Arbitrator Session 2
- How Long Does it Take from Filing to Trial?
  - District Courts
  - ITC
- How Much Does it Cost?
  - Fees and expenses
  - Contingency fees
  - Recovery of fees and expenses
- What Changes are on the Horizon?
  - Supreme Court
  - Patent law reform

Instructor: Russell E. Levine

Russell E. Levine, P.C., CLP, is a partner in the law firm of Kirkland & Ellis LLP where he specializes in patent infringement litigation and patent licensing. During his career, both as lead counsel and in conjunction with other Kirkland & Ellis partners, Russell has litigated over 200 patents and has analyzed and counseled clients with respect to several hundred more. He has litigated matters involving a broad array of patented technology such as automotive wheel aligners, wheel balancers, digital camera technology, and semiconductor memory chips. He currently serves as an International Delegate to the Licensing Executives Society International ("LESI") organization and as Chair of the LESI Patent and Technology Licensing Committee. Russell was recently inducted into the International Directory of Distinguished Leadership Hall of Fame for his contributions to the field of Intellectual Property. He also serves on the Editorial Board of the "Managing Intellectual Property" monthly publication. Mr. Levine holds a B.S. in Interdisciplinary Engineering and B.S. in Economics from Univ. of Michigan and a J.D. from the Univ. of Chicago Law School.

Registration Information:
Course I.D.# WB0940
Fees: 395; **SAE Members – Classic:** $356
Premium: $336; **Elite:** $316
0.4 CEUs

Root Cause Problem Solving: Methods and Tools Webinar

Four, two-hour sessions

For additional seminar information and to view upcoming open enrollment dates, visit: **www.sae.org/pdevent/WB0931**

Tough times require searching for things that we can change and making them better. But so often problems are solved with 'band-aids' and not root cause solutions. This approach is getting too expensive and at best only helps companies tread water. To combat these issues and adopt a fresh approach, teams can use the methods and tools of Root Cause Problem Solving to first view problems as opportunities for improvement, identify root causes and implement solutions to prevent recurrence. Benefits include improved quality and customer satisfaction, reduced operation costs, and greater employee knowledge of work processes. This proven 8-step approach to problem solving will help improve operational and financial performance by identifying causes and implementing solutions to significant or recurring problems. This approach to problem solving is used by many major automotive manufacturers.

Learning Objectives

By connecting with this webinar, you will be able to:
- Describe the 8-Step Problem Solving Methodology
- Define the difference between Symptom and Root Cause
- Use tools and techniques to solve problems
- Evaluate effectiveness of problems solving efforts
- Describe the role of problem solving in continuous improvement
- Write an action plan to apply problem solving to a specific concern

Who Should Attend

This course is applicable to those directly working in or responsible for performance improvement of any definable, repetitive process, e.g. manufacturing, design, logistics, purchasing, sales, or distribution, including:
- Manufacturing managers, supervisors and team leaders
- Manufacturing engineers
- Design engineers
- Quality engineers and technicians
- Technical managers
- Project team leaders
- Problem solving and quality improvement facilitators
- Anyone whose role includes problem solving; therefore all supervisors and lead personnel

Seminar Content

Session 1
- Overview
  - Following a process approach
  - What is a problem?
  - Inhibitors to effective problem solving
  - 8-step problem solving process overview
- Step 1: See the Problem as an Opportunity
  - Framing the problem solving effort
  - Identifying team members
  - Team roles
- Step 2: Describe the Problem
  - Symptoms vs. Causes
  - Methods for describing the problem
  - Using and charting data
  - Problem Is/Is-Not analysisSession 2
- Step 3: Implement Containment
  - Protect the Customer
  - Process Control Plan
- Step 4: Recognize Potential Root Causes
  - Identifying possible causes
  - Process Maps
  - Cause-Effect diagrams
  - 5-Why tool Session 3
- Step 5: Design Solution
  - Solutions that don't work
  - Process Controls and Error Proofing
  - Standardized Work
- Step 6: Implement Permanent Corrective Actions
  - Plan the work
  - Complete system changes
  - Verify effectiveness Session 4
- Step 7: Prevent Recurrence
  - Was the problem eliminated?
  - Layered audits
  - Leverage learnings with FMEA
- Step 8: Recognize Efforts
  - Team debrief and lessons learned
  - Evaluate and celebrate success
- Summary
  - Sufficiency checklist for effective problem solving
  - Continuous Improvement

Instructor: Murray Sittsamer

Murray has over 22 years experience in operations management, strategic planning, new process launches, financial analysis, quality systems and process improvement. During the past ten years, Murray has focused his work on supporting automotive OEMs and suppliers with their quality and productivity improvement efforts, especially in the areas of Advanced Product Quality Planning (APQP), Failure Mode and Effects Analysis (FMEA), variation reduction and Problem Solving. Before entering the consulting field in 1994, Murray served as director of distribution support and quality systems for Gelman Sciences. While there, he led a successful 15-month effort to obtain ISO 9000 quality system registration and had the role of project manager for a highly publicized groundwater contamination dispute. Murray holds a Master of Science in Industrial Administration from Carnegie Mellon University. He earned his undergraduate degree in industrial engineering from the University of Pittsburgh.

Registration Information:
Course I.D.# WB0931
Fees: 585; **SAE Members – Classic:** $527
Premium: $497; **Elite:** $468
0.8 CEUs

Understanding the FAA Aircraft Certification Process

Duration – 2 Days

For additional seminar information and to view upcoming open enrollment dates, visit: **www.sae.org/pdevent/C0821**

The task of certifying an aircraft or part can be overwhelming given the lengthy process and the many steps that are required. Understanding the process can greatly enhance the outcome and reduce unnecessary delays or frustrations. This course will provide an overview of the Federal Aviation Administration (FAA) organizational structure, its policies, guidelines and requirements leading to Type and Supplemental Type airworthiness approvals. It will also cover the rule-making process and rules applicable to aircraft parts and products. The course will define the roles and responsibilities of the Aircraft Certification Office (ACO), Manufacturing Inspection District Office (MIDO), Flight Standards District Office (FSDO), and the Aircraft Evaluation Group (AEG). Type and Supplemental Type Certification (TC and STC) processes, and Change Product Rule for alterations and modifications to previously type certified aircraft will be discussed. FAA rule-making process will be examined including review of FAA Orders, Notices, Advisory Circulars and other guidance material.

Learning Objectives

By attending this seminar, you will be able to:
- Manage certification programs more efficiently, schedule the required milestones accordingly, and identify problems and address them promptly
- Describe the principles of Type Certification and Supplemental Type Certification requirements and process
- Converse intelligently and enter negotiations with others involved in FAA certification programs
- Describe the FAA system, FAA orders, Advisory Circulars, FAA rule making process
- Define what exemptions and special conditions are and how to obtain them
- Identify the difference between airworthiness standard and operational rules

Who Should Attend

This course is designed for engineering and certification managers, design engineers, airworthiness and certification engineers, quality assurance inspectors and engineers, program managers, consultants, Federal Aviation Administration designated engineering and airworthiness representatives (DER and DAR) and other technical administrative personnel involved in FAA certification activities. The course will help newcomers to aircraft certification as well as experienced attendees better understand the certification process and be able to present and negotiate certification matters with the Federal Aviation Administration Aircraft Certification Office.

Seminar Content

DAY ONE
- FAA History, Organization and Hierarchy
  - FAA certification "lingo"
  - FAA system organizational chart and hierarchy
  - How regulations are developed
- FAA Roles and Responsibilities
  - Aircraft Certification Office
  - Manufacturing Inspection District Office
  - Flight Standard District Office
  - Aircraft Evaluation Group
- Issue Papers - What They Are and How They Are Used
  - Exemptions
  - Special conditions
  - Equivalent level of safety
- Certification Basis
- Change Product Rule

DAY TWO
- Type Certificate Data Sheet - The "Birth Certificate" of an Airplane
- Documents and How to Develop Them
  - Airplane Flight Manual Supplements
  - Instructions for Continued Airworthiness
  - Type Inspection Authorization
  - Request For Conformity
  - Certification Plan
  - Conformity Plans
- FAA Advisory Materials
- Support Documents
  - Parts Manufacturing Authorization
  - Technical Standard Order
  - Field approvals
  - FAA Form 337 approvals
  - 8110-3 approvals
- Type and Supplemental Type Certification Process
  - Certification Plans and FAA coordination
  - Data generation and approvals
  - Conformity inspections
  - Testing
  - Approvals

Instructor: Ken Farsi

Mr. Farsi is currently the VP of Engineering and ODA Administrator for Dassault Aircraft Services in Wilmington, DE, where his responsibilities include oversight of engineering groups and practices at all Dassault Aircraft Services locations. He is an FAA Designated Engineering Representative (DER) with Interior Arrangement and Compliance Inspection, as well as Aircraft Loading Document approval authority on Part 23 and 25 aircraft.

Mr. Farsi has taught aircraft certification and Federal Aviation Regulations as an Adjunct Instructor at Northrop-Rice Aviation Institute of Technology in Los Angeles, and Aircraft Systems at San Mateo Community College in San Mateo, California. He has participated in and managed FAA certification programs for major U.S., European, Chinese, and Australian airlines as a consultant. Along with a Bachelor of Science in Aircraft Maintenance Engineering Technology from Northrop University, Mr. Farsi has participated in graduate studies in Aerospace and Aviation Operations and Management at Embry-Riddle Aeronautical University. He holds FAA Airframe and Powerplant as well as Private Pilot Certificates.

Registration Information:
Course I.D.# C0821
Fees: $1,225; **SAE Members – Classic:** $1,103
Premium: $1,041; **Elite:** $980
1.3 CEUs

Fundamentals of Metal Fatigue Analysis

Duration – 3 Days

For additional seminar information and to view upcoming open enrollment dates, visit: **www.sae.org/pdevent/94024**

There is a potential for metal fatigue in any situation where a component is subjected to cyclic loads. Fatigue failures of various types are a key concern in increasing the reliability of products. Problems involving fatigue have become more severe with the demand for lighter weight structures and components. The effective use of fatigue analysis and predictive tools is critical for reducing the development time of new products. Two methods of metal fatigue analysis will be covered. The first is the stress-life approach. This method is used for high cycle or very long life fatigue problems where loads have fairly constant amplitude. Applications of this method include engine components, gears and shafts. The second method is the strain life approach, which is used for cases involving low cycle fatigue where loads may have a variable amplitude. Applications of this method include suspension and chassis components. The strain-life approach is also more useful when dealing with non-ferrous alloys. Other key topics to be addressed include residual stress, shot peening, cycle counting methods and environmental effects. Extensive use of example problems and case studies will be used. The overall objective of the course is for participants to gain an understanding of the phenomenon of metal fatigue and most importantly learn what methods are available to predict and prevent failures.

Learning Objectives

By attending this seminar, you will be able to:
- Differentiate various fatigue analysis methods
- Identify factors which can adversely affect fatigue behavior
- Apply processes which can be used to improve fatigue behavior
- Describe methods for analyzing fatigue at notches
- Indicate the steps necessary to determine the life of components subjected to variable amplitude loading

Who Should Attend

This course is intended for design, analysis or test engineers who deal with fatigue problems.

Prerequisites

The participant needs little if any exposure to metal fatigue analysis methods. The participant should have had the standard undergraduate courses in stress analysis and material science.

Seminar Content

DAY ONE
- Overview of Metal Fatigue and Analysis Methods
- The Stress-Life Approach
  - The S-N diagram and endurance limit
- Modifying Factors
  - Size and shape
  - Surface finish and treatments
  - Types of loading
- Mean Stress Effects
- Residual Stress and Shot Peening
- Example Problems

DAY TWO
- The Strain-Life Method
  - Limitations on the stress-life method
  - Cyclic stress-strain behavior
  - The strain-life diagram and parameters
- Mean Stress Effects
- Variable Amplitude Loading
- Damage Summing Methods
  - The Miner-Palmgren Rule
  - Non-linear methods
- Example Problems

DAY THREE
- Cycle Counting Methods
- Analysis of Notches
  - Stress-life method
  - Strain-life method
- Example Methods
- Environmental Effects

Instructor: Jess J. Comer

Dr. Jess J. Comer has significant teaching experience in the areas of machine design, dynamics of machines, metal fatigue and failure analysis. He is co-author of the text "Fundamentals of Metal Fatigue Analysis" and is a registered Professional Engineer in South Dakota. Dr. Comer is a member of SAE, ASME and ASEE. He holds a B.S. and an M.S. in mechanical engineering from South Dakota School of Mines and a Ph.D. from the University of Illinois at Urbana-Champaign.

Registration Information:
Course I.D.# 94024
Fees: $1,595; **SAE Members – Classic:** $1,436
Premium: $1,356; **Elite:** $1,276
2.0 CEUs

Metal Corrosion and Its Prevention

Duration – 2 Days

For additional seminar information and to view upcoming open enrollment dates, visit: **www.sae.org/pdevent/99006**

Corrosion accounts for billions of dollars in losses to a variety of metallic structures and products annually. This seminar provides insight into corrosion, its underlying causes, and potential solutions, topics which are important to all engineers involved with the design and specification of metal components and structures. Elementary concepts related to the more common types of corrosion will be reviewed, as well as the various methods available for minimizing corrosion in metals. This course will conclude by examining at least two corrosion case histories of interest to engineers involved in transportation vehicle design.

Types of corrosion to be described in this seminar include galvanic corrosion (dissimilar metals), concentration cell corrosion, crevice corrosion, stress corrosion, and corrosion-assisted fatigue. In addition, "uniform" corrosion will be discussed as it applies to such common occurrences as the general rusting of steel. Methods of corrosion protection include cathodic protection from sacrificial anodes and impressed DC voltage, anodic protection, inhibitors, and coatings. The effectiveness and limitations of these techniques will be discussed.

Learning Objectives

By attending this seminar, you will be able to:
- Describe the basic electrochemical concepts of corrosion
- Identify the primary methods that can be used to prevent or minimize corrosion
- Define the nature of an actual corrosion problem and recommend a workable solution

Who Should Attend

Automotive, aircraft, off-highway and marine engineers involved in design, production, and quality functions that have an interest in corrosion and corrosion prevention in metal components and assemblies will benefit from this seminar. Since corrosion can only be adequately understood from electrochemical considerations, it is strongly recommended that each attendee has completed at least a one-semester course in college chemistry in which he/she was introduced to basic electrochemistry.

Seminar Content

DAY ONE
- General Introduction to Corrosion
- Electrochemical Nature of Corrosion
  - Anode-cathode relationships
  - Electrode potentials
  - Electromotive and galvanic series
- Rates of Corrosion
  - Measurement and specification
  - Polarization effects
  - Prediction
  - Passivity and environmental effects
- Corrosion Cells
  - Metal composition
  - Electrolyte concentration
  - Stress
- Forms of Corrosion
  - Uniform attack
  - Galvanic (dissimilar metals)
  - Crevice Corrosion
  - Pitting
  - Intergranular attack
  - Corrosion-assisted fatigue
  - Stress corrosion and hydrogen embrittlement
- Corrosion Problems and Calculations (Workgroups)

DAY TWO
- Corrosion Environments
  - H_2O and aqueous solutions
  - Acids and bases
  - NaCl and seawater
- Methods of Corrosion Prevention
  - Overview
  - Component design
  - Coatings
  - Cathodic protection
  - Anodic protection (passivation)
  - Inhibitors
  - Materials selection and treatment
- Video - "Corrosion in Action"
- Case Studies in Corrosion of Metals
  - Corrosion in the automotive industry
  - Corrosion in aluminum and aluminum alloys
  - Steel weldment corrosion
- Summary and Open Discussion

Instructor: Darrell Smith

Dr. Darrell Smith is a consultant in metallurgy and materials and is Professor Emeritus of Metallurgical Engineering at Michigan Technological University. Prior to joining the faculty at MTU, he was employed as a process metallurgist by Babcock and Wilcox and as a research metallurgist by General Electric. Dr. Smith has conducted extensive continuing education seminars related to metals and materials and engineering, including corrosion and oxidation. He has published approximately 50 research papers in archival journals related to specific aspects of materials science and engineering. Dr. Smith, a Fellow of ASM International and APMI International, has served on the Boards of Directors for both organizations. He is the recipient of the Distinguished Educator Award from ASM and the Distinguished Service to Powder Metallurgy Award from the Metal Powder Industries Federation. Dr. Smith has a B.S.-Met E. from Michigan Technological University and a M.S.-Met. and Ph.D. from Case Western Reserve University.

Registration Information:
Course I.D.# 99006
Fees: $1,225; **SAE Members – Classic:** $1,103
Premium: $1,041; **Elite:** $980
1.3 CEUs

Steel Heat Treatment

Duration – 2.5 Days

For additional seminar information and to view upcoming open enrollment dates, visit: **www.sae.org/pdevent/99016**

Numerous steel components in the automotive industry and its related vehicle manufacturing industries are heat treated in order to obtain the required final properties and/or to enhance their ease of fabrication. In addition, much of the tooling used by these industries for fabrication of components is also heat treated. The practice of heat treating is based on sound metallurgical principles that govern the changes in the microstructure of steel when it is heated and subsequently cooled under controlled conditions. Some knowledge and appreciation of these principles as they are applied to commercial heat treating operations is very helpful in the design and specification of heat treating procedures as well as in the solution of problems arising from poor heat treating practices.This seminar will focus specifically on the heat treatment of steel. Fundamental background will be presented that will connect the ways in which microstructures (and therefore the properties) of steels are altered due to various types of thermal processing. Following an introduction to austenitizing (initial high temperature heating) and an examination of the various ways in which austenite transforms at lower temperatures, the influence of steel composition on heat treating response and properties will be discussed. These fundamentals will be emphasized in discussions of commercial heat treatments designed to either soften or harden steels, including annealing, normalizing, spheroidizing, austempering, marquenching, and conventional quenching and tempering. Common methods for surface hardening of steel, including carburizing and induction hardening, will also be examined.

Steel heat treating is a critical processing technology in the production of most vehicles. This seminar will provide an opportunity to study heat treating from a logical and basic point of view. In turn, the attendee will come away with a more thorough understanding of the microscopic events that occur during thermal processing of steel, and how critically important it is to control these events to obtain acceptable and reproducible properties.

Learning Objectives

By attending this seminar, you will be able to:
- Recognize and define the relationships between the microstructure of steel and its mechanical properties
- Associate the various possible structures and properties of steels with the composition of the alloy and the heat treating practice used
- Describe the metallurgical changes that accompany various commercial heat treatments
- Formulate logical fundamentally based solutions to real steel heat treating problems encountered in the industry

Who Should Attend

Some prior exposure to steel heat treatment will be helpful for the attendee. Such exposure may be from job-related activity, a home-study course, or other training instrument. The seminar will be of benefit to those persons whose on-the-job activity is in some way associated with steel heat treatment and properties. The level of the presentation will appeal most to the engineer and skilled technician level, and will be of interest to heat treating and components vendors to the industry as well as those involved directly with vehicle production, engineering, and quality control.

Seminar Content

DAY ONE
- General Introduction to Steel Heat Treating
- Definition and Classification of Steels
  - Plain carbon and alloy steels
  - Steel designations (AISI-SAE classification system)
- Metallurgical Fundamentals Related to Steels
  - Crystal structure changes in iron and steel
  - Carbon as an alloying element with iron
  - The Fe-Fe 3C phase diagram
  - Phases and microstructures in steels
- Rate of Microstructure Change During Heat Treatment
  - Isothermal transformation
  - Transformation during continuous cooling
  - Alloying element effects on heat treating kinetics

DAY TWO
- Hardenability of Steels
  - Definition of hardenability
  - Influence of alloying elements
  - Considerations of steel thickness and cooling rates
  - Quenching media
  - The Jominy end-quench test for hardenability
  - "H" steels (specified hardenability limits)
- Review of Mechanical Properties
  - Strength and hardness
  - Ductility and toughness
  - Fatigue
- Commercial Heat Treating Processes
  - Annealing
  - Quenching and tempering
  - Marquenching
  - Austempering

DAY THREE (ends at approximately 12:00 noon)
- Surface Hardening of Steels
  - Unaltered surface composition (carburizing, carbonitriding)
  - Altered surface composition (induction, flame, laser)
- Workgroups — Solutions to Heat Treating Problems
- Summary and Wrap-Up

Instructor: Darrell Smith

Dr. Darrell Smith is a consultant in metallurgy and materials and is Professor Emeritus of Metallurgical Engineering at Michigan Technological Univ. Prior to joining the MTU faculty, he was employed as a process metallurgist by Babcock and Wilcox and as a research metallurgist by General Electric. He has been active in both ASM International and APMI International (formerly the American Powder Metallurgy Institute), having served on the Boards of Directors for both organizations. Dr. Smith is the recipient of the Distinguished Educator award from ASM and the Distinguished Service to Powder Metallurgy award from the Metal Powder Industries Federation. He has conducted intensive continuing education seminars related to metals and materials for more than 20 years, having presented a number of topics to very diverse audiences, numbering in excess of 3,000 attendees. In addition, Dr. Smith has taught several undergraduate courses at MTU in which steel heat treatment was a major component of the syllabus, delivering these courses to approximately 5,000 engineering majors. He has published approximately 50 research papers in archival journals and conference proceedings, many of which deal with steels and their thermal treatments. He is a Fellow of ASM International and APMI International. Dr. Smith holds the B.S.-Met.E. from MTU and the M.S.-Met. and Ph.D. from Case Western Reserve University.

Registration Information:
Course I.D.# 99016
Fees: $1,545; **SAE Members – Classic:** $1,391
Premium: $1,313; **Elite:** $1,236
1.7 CEUs

New IAQG Sanctioned Aerospace Auditor Transition Training (AATT)

Duration – 4 Days

For additional seminar information and to view upcoming open enrollment dates, visit: **www.sae.org/pdevent/C1034**

*In the event you do not see the class dates or location you are looking for, please contact SAE Customer Service at 1-877-606-7323 or email to CustomerService@sae.org. SAE International, the society dedicated to advancing mobility engineering worldwide, is pleased to be a recognized training provider of the classroom component of the IAQG-Sanctioned Aerospace Auditor Transition Training (AATT).

As an approved training provider, SAE is committed to providing the highest level of quality training using the most qualified instructors in the industry. This four-day course is the instructor-led classroom component of the AS9100 IAQG-Sanctioned training and includes how to audit to the AS9100 series standards using the process-based approach of AS9101D. Along with the training in this instructor-led component, there is a continual evaluation of each participant, paying particular attention to his/her active participation, role play, and case study exercises. The fourth day includes an online final examination and interview.

This course is certified by RABQSA International and meets the classroom training requirements of the IAQG Sanctioned Aerospace Auditor Transition Training for AS9100:2009. Successfully completing the AATT program and the awarding of the Certificate of Successful Completion satisfies the training requirements for auditors to update their AA, AEA and AIEA certification.

Required Training Elements:

There are three required elements to completing the Aerospace Auditor Transition Training and include the initial online exams and training module, the instructor-led AATT classroom course, and the final exam and interview.

Online Pre-Work:

- Prior to taking the classroom portion of this course, participants complete the Knowledge and the Application Initial Examinations (45 minutes each). Participants obtaining a score of 90% or better on both exams have the option of opting out of the online training module. Participants scoring less than the prerequisite 90% are then required to complete the Foundations: Understanding 9100 online training module. This module typically takes between eight and twenty hours to complete. Participants will receive a Certificate of Completion of the Online Training Module and must present this certificate to SAE to gain admittance to the classroom course. Note: Registration for the online exams and training module must be done through Plexus Intl. It is recommended that everyone review the online training module prior to attending the AATT classroom course. Participants have access to this online module and associated online material for future reference.

Instructor-Led Classroom Training:

- This course consists of three days of instructor-led training and one day of assessments. During the three days of classroom training attendees develop an audit package through various exercises. In addition, the instructors will evaluate the attendee's ongoing participation and learning achievement during the class. Class size is limited to twelve.

Final Exam:

- On the fourth day attendees complete an online knowledge and application exam. The attendees will go through an interview with the instructors to review his/her audit package as well as an explanation of the instructors' conclusions. Based on the aggregate of the trainee's ongoing evaluation during the instructor-led course, the online knowledge and application exam, and the interview each participant will be issued a final grade. An aggregate score of at least 80% is required to pass.

Learning Objectives

By successfully completing this course, attendees will be able to fulfill the classroom requirement of the IAQG Sanctioned Aerospace Auditor Transition Training by demonstrating knowledge of

- Audit planning
- Auditing top management
- Auditing process owners
- Auditing process trails
- Conclusions, reporting, and certification
- Surveillance and recertification
- Special audits

Who Should Attend

For auditors seeking authentication to AS9100:2009, this certified course is intended to fulfill the instructor-led classroom training requirement of the Aeropace Auditor Transition Training (AATT). Additionally, aeronautics, space, and defense industry personnel responsible for establishing, implementing, and evaluating quality management systems will benefit from the information presented in this course.

Prerequisites

Registering for and completing the AS9100 online module through Plexus Intl. is the first step in meeting the IAQG AATT training requirements. Proof of satisfactory completion (copy of Certificate of Completion) required to gain admittance to the instructor-led course. The online component begins with the Knowledge and Application Initial Examinations followed by the Foundations: Understanding 9100 online training module. Participants achieving a score of 90% or better on the exams may opt out of taking the online training module. Upon completion, participants will be provided a Certificate of Completion of the Online Modules. In order to be admitted to the SAE instructor-led classroom course, must present to SAE the

Certificate before the start of class or achieve a passing score of 90% on both Initial Examinations.

Seminar Content

DAY ONE

- Bridging the online modules and classroom training
- Pre-Audit Activities
- Stage 1 Audit Activities

DAY TWO

- Stage 2 Audit Planning
- Auditing Top Management
- Auditing Process Owners
- Auditing Process Trails

DAY THREE

- Audit Conclusions
- Audit Reporting
- Certification Requirements
- Surveillance, Recertification and Special Audits
- Use of the new AS9101D Audit Forms

DAY FOUR

- Final Online Knowledge and Application Exams
- Oral Interview Exam FINAL DETERMINATION OF PASS/FAIL
- Final scores and the determination of Pass/Fail are provided by the IAQG and not the training provider.

Registration Information:
Course I.D.# C1034
Fees: $2,195; **SAE Members – Classic:** $2,145
Premium: $2,095; **Elite:** $2,045
2.6 CEUs

New Implementing AS9100C: Understanding and Transitioning to the New Requirements

Duration – 2 Days

For additional seminar information and to view upcoming open enrollment dates, visit: **www.sae.org/pdevent/C1119**

Individuals responsible for quality management system, implementation, and transition to the AS9100:2009 series of standards for Aviation, Space, and Defense will require an understanding of the requirements for the preparation and execution of the audit process as defined in these revised standards. Management and implementers of AS9100:2009 Rev. C within these organizations must also be aware of what these changes may mean for their company.

This two-day seminar will begin with an in-depth review of changes in AS9100 Rev. C: Quality Management Systems - Requirements for Aviation, Space and Defense Organizations and the intent of the revised requirements. Included is a detailed discussion of the standard, with special emphasis on the process approach, project planning, risk management, configuration management, and work transfer. Additionally, AS9101 Rev D: Quality Management Systems Audit Requirements for Aviation, Space, and Defense Organizations and AS9104-1: Requirements for Aviation, Space, and Defense Quality Management System Certification Programs will be examined so that individuals responsible for AS9100 Rev. C implementation understand the system and audit requirements and the immediate influence these changes will have on their certificate transition.

Learning Objectives

By attending this seminar, you will be able to:

- Summarize the International Aviation, Space & Defense standards change process and why changes to the standards were required.
- Identify key changes between AS9100 Rev. B and Rev. C and how these changes will impact an organization's certificate transition.
- Identify the requirements of AS9100:2009 Rev. C with emphasis on the process approach, project planning, risk management, configuration management, and work transfer.
- Identify and understand AS9101:2010 Rev. D Audit Requirements for conducting and reporting audits and the impact these requirements will have on organizations and implementers involved in transitioning to Rev. C.
- Identify key components of AS9104-1 Certification Process Overview and the influence this standard will have in the transition and certification process.

Who Should Attend

This seminar is intended for Aviation, Space and Defense industry professionals who desire a detailed understanding of the requirements of AS9100 Rev. C in order to manage, implement, and perform internal audits to the standards. Additionally, trainers, consultants, and other individuals that maintain a significant interest in AS9100 standards will benefit from the information presented in this seminar.

Seminar Content

DAY ONE:

- Overview of AS&D Standards
  - Rationale for changes and the revision process
- AS9100:2009 Rev C Changes Overview
- AS9100:2009 Rev C Detailed Discussion
  - Quality Management System and the Process Approach
  - Management Responsibility with emphasis on Customer Focus
  - Resource Management
  - Product Realization with emphasis on: Project Management; Risk Management; Configuration Management; Work Transfer
  - Measurement, Analysis and Improvement

DAY TWO:

- AS9100:2009 Rev C Detailed Discussion (continued)
- AS9101:2010 Rev D
  - Aviation, Space & Defense 3rd Party Auditing Focus
  - Enhanced audit processes
  - Process based management systems
  - Phases of the audit process
  - Customer focus and feedback
  - Conformity AND effectiveness
  - New forms and their impact--Non Conformity Report (NCR); Objective Evidence Record (OER); Process Effectiveness Assessment Report (PEAR)
- AS&D AS9104/1 Certification Process Overview
  - Summary of Certification Body requirements and expectations--NCR requirements; Audit day table; Audit report generation

Instructor: Buddy Cressionnie

Mr. Cressionnie is currently the Americas IAQG 9100 Team Lead responsible for maintenance, revision, and clarification of the AS9100 standard. He is active in standards development as a voting member of the US Technical Advisory Group (TAG) to ISO/TC 176. He serves on the US TAG Interpretations Committee and is the Aerospace Sector Liaison to the US TAG. He led the implementation of AS9100/ISO 9001:2000 standards and quality process area for Capability Maturity Model Integration at Lockheed Martin Aeronautics into a centralized, integrated quality system. Buddy Cressionnie is an ASQ senior member with quality manager and quality auditor certifications. He is a certified RABQSA aerospace experienced auditor and International Register of Certified Auditors (IRCA) lead auditor for ISO 9001 and ISO 14001. Buddy Cressionnie received his MBA degree from Texas Christian University and Bachelor of Science in Engineering from the University of Florida.

Registration Information:
Course I.D.# C1119
Fees: $1,285; **SAE Members – Classic:** $1,157
Premium: $1,092; **Elite:** $1,028
1.3 CEUs

New AS9100C Internal Auditor Training

Duration – 3 Days

For additional seminar information and to view upcoming open enrollment dates, visit: **www.sae.org/pdevent/C1120**

Internal audits are a requirement of the AS9100 Rev C standard and one of the fundamental requirements of the internal audit program is to verify the compliance of the organization's quality management system to the AS9100 standard. Internal auditors must be knowledgeable of these requirements and the expectations as identified in the standard. In addition, the requirements of AS9101Rev D have significantly changed the way audits are expected to be performed in the Aviation, Space and Defense industries. This three-day internal auditor training program is designed to provide potential and existing internal auditors with the knowledge necessary to understand and successfully audit an organization against AS9100 Rev C: Quality Management Systems - Requirements for Aviation, Space and Defense Organizations. Additionally, attendees will participate in a detailed examination of the requirements of AS9101

KEY

CERTIFICATE PROGRAM ACTAR APPROVED SEMINARS WEBINARS

Rev D: Quality Management Systems Audit Requirements for Aviation, Space, and Defense Organizations. An overview of AS9101D Quality Management Systems Audit Requirements for Aviation, Space, and Defense Organization will also be provided to identify the effect this standard has on the way internal audits should be conducted. Case studies and classroom exercises will also be presented in this class to provide participants the comprehensive knowledge and practical skills necessary to be an effective internal auditor.

Who Should Attend

This training program is designed for quality professionals in the Aviation, Space and Defense industries who are involved in the internal audit program and/or management of quality systems seeking compliance to the AS9100 and AS9101 Standards.

Learning Objectives

By attending this training program you will be able to:
- Identify the basic elements of a quality management system
- Summarize the impact ISO 9000:2005 has on the application of other Standards
- Identify and explain the requirements of AS9100:2009 Rev C including process approach, project planning, risk management, configuration management, and work transfer
- Identify and explain the key requirements of AS9101:2010 Rev D Auditing a QMS
- Demonstrate the knowledge and skills required to independently perform a quality management system audit
- Identify the tools and techniques necessary for carrying out an effective audit
- Document the outcomes of an audit

Course Content

DAY ONE
- Module 0: Agenda and Introductions
- Module 1: Introduction to the basics of Quality Management Systems
- Module 2: ISO-9000:2005 Overview
  - Terms and Definitions
- Module 3: AS9100:2009, Rev C Overview
  - Quality Management System with emphasis on the Process Approach
  - Management Responsibility with emphasis on Customer Focus
  - Resource Management
- Product Realization, with emphasis on: Project Management; Risk Management; Configuration Management; Work Transfer
- Measurement, Analysis and Improvement

DAY TWO
- Module 3: Continued
- Module 4: AS9101:2009, Rev D Overview
  - Quality Management System with emphasis on the Process Approach
  - Management Responsibility with emphasis on Customer Focus
  - Understanding the new Aviation, Space & Defense 3rd Party Auditing Focus
  - Use of AS9100C Audit Forms
- Module 5:
  - Overview of the Audit Life Cycle
  - Understand Audit Tools & Techniques
  - Effectively prepare to conduct an Audit
  - Effectively conducting QMS Audits
  - Writing effective audit documentation

Day Three
- Module 5: Continued
- Module 6:
  - Prepare to conduct an Audit (case studies)
  - Conduct an audit (simulated)
  - Report on the outcome of an audit

Instructor Name: Paul J. Kunder

Mr. Kunder is the President of Amera-Veritas, Inc., a provider of quality, safety, and risk management. Mr. Kunder is a lead instructor for the Aerospace Auditor Transition Training and is currently an International/Americas Quality Group and RABQSA AS9100 Aerospace Auditor and Quality System Lead Auditor (ref. #1834). He is active in standards development as a voting member of the US Technical Advisory Group (TAG) to ISO Technical Committee 176 which is responsible for development of the ISO 9001 Standard. He serves as the Vice Chair of the National ANSI/ASQ Z1A Committee on Auditing (ISO 19011) and on the US TAG Interpretations Committee. He has performed more than five hundred audits and has assisted more than eighty organizations with the development and certification of their quality management systems including the Federal Aviation Administration Office of Aviation Safety. Prior to his current position, Mr. Kunder was involved in the accreditation of several 3rd party registrars, acted as an administrator for the first RAB accredited registrar in the United States and works as a subcontract auditor for a number of registrars. Mr. Kunder is an ASQ senior member and holds a B.S. in Mechanical Engineering.

Registration Information:
Course I.D.# C1120
Fees: $1,495; **SAE Members – Classic:** $1,356
Premium: $1,271; **Elite:** $1,196
2.0 CEUs

Aerospace Product Support: Sustainment Throughout the Life Cycle

Duration – 2 Days

For additional seminar information and to view upcoming open enrollment dates, visit: **www.sae.org/pdevent/C0945**

In today's aerospace industry, product life-cycles are often being extended far beyond a product's original design expectations. With fewer and fewer new aerospace products being introduced into the marketplace, there is a dramatic need for increased emphasis on supporting these products in the most efficient and effective manner possible throughout the entire product life-cycle. In addition to the initial product acquisition cost, customers are becoming more aware and sensitive to the product's total life-cycle cost. The long-term costs to operate, maintain, and otherwise sustain these products are often a determining factor in the initial product acquisition.

This two day seminar is intended to introduce participants to the various approaches, technologies, and tools available to support a product throughout the product's total life-cycle in the most efficient manner possible. Major topics presented and discussed during this seminar include The Elements of Logistics, Performance Based Logistics, Product Support Integration, and regulatory requirements. Collectively, the information presented in this seminar will equip attendees with the skills and techniques needed to help them comfortably and confidently develop the best tailored support package, satisfying the needs of both the customer and the provider.

Learning Objectives

By attending this seminar, you will be able to:
- Identify and apply basic concepts of Product Support, including Contractor Logistics Support, Total System Performance Requirements, Performance-Based Logistics, and Primary Support Integration
- Evaluate elements of cost associated with life-cycle support/sustainment opportunities
- Compare and contrast the different approaches that may be taken to provide total life-cycle support in aerospace programs

- Assess relative risks to both the provider and the customer in the various approaches
- Determine how to best integrate sustainment activities within the OEM as well as after-market provider business plans

Who Should Attend

Technical professionals, as well as current and prospective Program/Project managers, Product Support Managers, and Sustainment Specialists will benefit by attending this seminar. This seminar will also be of value to individuals in other disciplines, including marketing and general management, that require an understanding of the concepts and strategies of effective life-cycle sustainment programs.

Prerequisites

Basic knowledge or awareness of product support, logistic support, customer support, or sustainment will be beneficial but is not required.

Seminar Content

DAY ONE
- Introduction to Aerospace Product Support
  - Developing the class definition of product support -- Attributes; Shared experiences
  - Setting expectations
- Elements of Product Support Offerings
  - Characteristics of Product Support
  - Compare and Contrast -- Logistics Support; Product Support; Customer Support
  - "Bits and pieces" of product support
  - What constitutes success?
- Support Integration
  - How Support Integration works
  - Primary Support Integrator -- How PSI works
  - Third-Party Logistics Provider -- Definition; How 3PL works

DAY TWO
- Contractor Logistics Support
  - How CLS works
  - Customer and contractor roles
  - Constructing a CLS proposal -- Estimating costs
- Performance-Based Logistics
  - How PBL works
  - Customer and contractor roles
  - Constructing a PBL proposal -- Estimating costs
- Regulatory and Guidance Document Identification
  - Regulatory documents and reports
  - Development and use of metrics
  - Notification of problems and re-plans to stakeholders
- Seminar Review and Open Dialog

Instructor: Drexel L. Rutledge

Mr. Rutledge is an Aerospace Consultant with Integrity Engineering, Inc. where he works with several aerospace companies in the area of Product Support and Sustainment. Most recently, his expertise in performance based logistics and international support applications have been sought out by several DFW area providers. Prior to joining Integrity Engineering, Inc, Mr. Rutledge was employed by Lockheed Martin Aeronautics Company as the Systems Engineering Director responsible for developing and delivering the technical information needed to operate and maintain all aircraft manufactured or supported by Lockheed Martin Aeronautics by all US and foreign operators. Mr. Rutledge is a Certified Professional Manager, a Past Chairman of the Product Support Executive Board of Directors of the Aerospace Industries Association, a member of the Air Force Association, and an Honorary Lifetime Member of the International Office and Professional Employees Industrial Union. He has served as the Industry Representative and co-chair of multiple Department of Defense and Industry project teams including the 2003 Logistics Transformation Initiative. He is the recipient of the 2006 Leonard Ross Memorial Award for Outstanding Contributions in the field of Logistics. Mr. Rutledge has a Bachelor of Science in Business Management as well as a Master of Business Administration from LeTourneau University in Texas.

Registration Information:
Course I.D.# C0945
Fees: $1,225; **SAE Members – Classic:** $1,103
Premium: $1,041; **Elite:** $980
1.3 CEUs

Design of Experiments (DOE) for Engineers

Duration – 2 Days

For additional seminar information and to view upcoming open enrollment dates, visit: **www.sae.org/pdevent/C0406**

Design of Experiments (DOE) is a methodology that can be effective for general problem-solving, as well as for improving or optimizing product design and manufacturing processes. Specific applications of DOE include identifying proper design dimensions and tolerances, achieving robust designs, generating predictive math models that describe physical system behavior, and determining ideal manufacturing settings. This seminar utilizes hands-on activities to help you learn the criteria for running a DOE, the requirements and pre-work necessary prior to DOE execution, and how to select the appropriate designed experiment type to run. You will experience setting up, running, and analyzing the results of simple-to-intermediate complexity, Full Factorial, Partial Factorial, and Response Surface experiments utilizing manual methods as well as a hands-on computer tool that facilitates experimental design and data analysis. You will also receive an overview of Robust DOE, including the Taguchi DOE Method.Each attendee will receive a 30 day Minitab™ Product Demo for use in the class. While some computers will be available, attendees are encouraged to bring a laptop computer and/or a calculator to the seminar to provide additional hands-on time.

Learning Objectives

By attending this seminar, you will be able to:
- Decide whether to run a DOE to solve a problem or optimize a system
- Set-Up a Full Factorial DOE Test Matrix, in both Randomized and Blocked forms
- Analyze and Interpret Full Factorial DOE Results using ANOVA, (when relevant) Regression, and Graphical methods
- Set-Up a Fractional (Partial) Factorial DOE, using the Confounding Principle
- Analyze and Interpret the results of a Fractional Factorial DOE
- Recognize the main principles and benefits of Robust Design DOE
- Decide when a Response Surface DOE should be run
- Select the appropriate Response Surface Design (either Plackett-Burman, Box-Behnken, Central Composite, or D-Optimal)
- Interpret Response Surface Outputs
- Utilize the MiniTab&#8482 Software tool to analyze data

Who Should Attend

This seminar will benefit engineers, designers and quality professionals in research, design, development, testing and manufacturing who are interested or active in one or more of the applications listed above. Individuals should have an engineering degree or equivalent coursework in math, statistics and computers.

KEY
CERTIFICATE PROGRAM ACTAR APPROVED SEMINARS WEBINARS

Seminar Content

- Icebreaker: Team Problem Solving Exercise Using Engineering Judgment
- What is DOE?
  - Types of Designed Experiments
  - Application Examples
  - Where DOE Fits in with Other Tools/Methods
- DOE Requirements: Before You Can Run an Experiment
  - Writing Problem and Objective Statements
  - Ensuring DOE is the Correct Tool
  - Selecting Response Variable(s) and Experimental Factors
  - Actual vs. Surrogate Responses
  - Attention to Experiment Logistics
  - Test Set-up and Data Collection Planning
  - Selecting and Evaluating a Gage
- Full Factorial Experiments
  - Introduction to Cube Plots for 3- or 4-factor 2-level Experiments
  - Experiment Set-Up
  - Factor Levels, Repetitions, and "Right-Sizing" the Experiment
  - Experiment Terms to Estimate (Main Effects and Interactions)
  - High-Level Significance Evaluation
- DOE Statistical Analysis
  - ANOVA Principles for Simple Full Factorial Experiments -- Statistics Basics; Significance Test Methods; Effect of Non-Random Experiments; Estimating Significance Test "Power"; Confidence Intervals; Estimating Random Error
  - Analysis Plots -- Normal and Half-Normal Plots; Main Effect and Interaction Plots
  - Regression Analysis of Simple Full Factorial Experiments
  - Using MiniTab ™ for Full Factorial DOE Experiments
- Fractional (Partial) Factorial Experiments
  - The Confounding Principle -- How it Works; What Information We Lose with Confounding (and why we might not care!)
  - Selecting and Using Generators (Identities) to Set Up Confounding Strings
  - Determining Which Factor Combinations to Run
  - Analyzing Fractional Factorial Experiment Data
  - Using MiniTab ™ for Fractional Factorial Experiments
- Robust Design Experiments (Overview)
  - What is Robustness?
  - Control and Noise Factors
  - Classical and Taguchi Robust DOE Set-Up
  - Robustness Metrics
  - Analytical and Graphical Output Interpretation
- Response Surface Modeling
  - What Response Surface Models do BEST
  - Available Response Surface DOEs (Plackett-Burman, Box-Behnken, etc.) -- Ideal Situation(s) to Use Each Response Surface DOE Type; Cube Plot Set-up of Each Response Surface DOE
  - Analyzing Response Surface Experiment Data
  - Methods for Finding Optimum Factor Values
  - Using MiniTab ™ for response Surface Experiments
- Miscellaneous Notes and Wrap-up

Instructor: Kevin Zielinski

Kevin Zielinski currently owns and operates Red Cedar Media LLC, a training and corporate communications consulting, design, development and delivery company based in Michigan. Previously, Kevin was Senior Applications Specialist for EDS (including General Motors/EDS and Hewlett Packard/EDS) specializing in technical training delivery, training consulting, courseware design and development, and e-Learning. He has designed, developed and delivered over 40 lecture- and web-based courses attended by General Motors and EDS employees worldwide. Mr. Zielinski has also served as Adjunct Professor for the Wayne State University College of Engineering and WSU/Focus:Hope for many years. His areas of expertise include: e-Learning design and development, Quality Tools and Methods (Design of Six Sigma, Robust Engineering, Design of Experiments (DOE), Statistical Tolerancing and GD&T); Design for Manufacturing and Assembly (DFMA); Engineering Economics; and Plant Floor Throughput Improvement. He has been an instructor for SAE Professional Development since 1990, and is a recipient of SAE's Forest R. McFarland Award (April 2005). He holds a bachelor's and master's degree in engineering from Wayne State University.

Registration Information:
Course I.D.# C0406
Fees: $1,265; **SAE Members – Classic:** $1,139
Premium: $1,075; **Elite:** $1,012
1.3 CEUs

Weibull-Log Normal Analysis Workshop

Duration – 3 Days

For additional seminar information and to view upcoming open enrollment dates, visit: **www.sae.org/pdevent/86034**

RMS (Reliability-Maintainability-Safety-Supportability) engineering is emerging as the newest discipline in product development due to new credible, accurate, quantitative methods. Weibull Analysis is foremost among these new tools. New and advanced Weibull techniques are a significant improvement over the original Weibull approach. This workshop presents special methods developed for these data problems, such as Weibayes, with actual case studies in addition to the latest techniques in SuperSMITH®; Weibull for risk forecasts with renewal and optimal component replacement. Class work is used to reinforce key concepts, lectures are based on actual case studies, and personal computers and hands-on experiments are used to analyze dozens of Weibull & Log Normal problems. Students will be fully capable of performing basic and advanced RMS Engineering analysis with their own software on completion of the workshop.

Attendees will receive the entire SuperSMITH® package - a complete self-study course and combined software package containing: SuperSMITH® Weibull, SuperSMITH® Visual, The New Weibull Handbook® - 5th Edition and the PlayTIMETM Tutorial Booklet. A $960 value!

Optional Weibull Introduction

To accelerate your learning in this Workshop, you may want to complete the SAE Fast Track, Introduction to Weibull Engineering. This highly recommended overview of Weibull engineering can improve your retention prior to taking the workshop or provide a great review afterwards.

Learning Objectives

By attending this seminar, you will be able to:
- Analyze design, development, production, and service failures
- Model product lifetime and reliability
- Evaluate calibration and maintainability plans
- Analyze inspection data
- Reduce test substantiation, time and costs

Who Should Attend

An engineering undergraduate degree in any discipline would be beneficial. Engineers responsible for reliability, safety, supportability, maintainability, materials, warranties, life cycle cost, design, structures, instrumentation and logistics will find these Weibull techniques extremely useful.

Seminar Content

DAY ONE Undergraduate Weibull Analysis
- Background, Development & Introduction - 23-Minute Video Short Course
- How to do Weibull Analysis
- Interpretation of Good Weibulls - 2 & 3 Parameter

- Are two Weibull datasets significantly different?
- Interpretation of Bad Weibulls
- Failure Predictions and Weibull Risk Analysis
- Case Studies, Failure Forecasting
- Weibull Experiments (Wire Rupture, Torsion, LCF, Accelerated Testing), Classwork Problems and Solutions

DAY TWO Postgraduate Weibull Analysis
- Maximum Likelihood Weibull Theory and Application
- WeiBayes Analysis
- Dauser Shift, Warranty Analysis
- Rank Regression vs. Maximum Likelihood
- Extremely Small Samples Analysis
- Log Normal Analysis
- Predicting Future Failures With & Without Renewals
- One Failure Weibull Case Study
- An Introduction to SuperSMITH® Software, Features, Input, Analysis, Output
- Summary of Weibull Methods
- Class Work Problems
- Experimental Wire Data Distribution Analysis
- Optimal Replacement Intervals, Block Replacement
- Playtime With SuperSMITH® Tutorial
- Ph.D. Oral Examination

DAY THREE Confidence Intervals and System Models
- Confidence Intervals, "The Good, The Bad and The Complicated"
- Comparing Designs
- The Binomial & Poisson, The Thorndike Chart
- Duane-AMSAA Reliability Growth Modeling - New Useful Technology for Tracking Development Testing
- The Exponential Related to the Poisson and the Weibull
- Kaplan-Meier Survival Analysis (Now Included in SuperSMITH® Weibull)
- Duane-AMSAA Employed for Analyzing Renewal-Repairable Systems
- System Models
- Classwork
- Complete Playtime With SuperSMITH®

Instructor: Wes Fulton

Mr. Wes Fulton is the Founder and CEO of Fulton Findings. Prior, he was a program engineer/manager for AiResearch Los Angeles Division, Allied-Signal Aerospace Corporation. As a program engineer for aircraft actuation projects he had engineering and management responsibility for the Indigenous Defensive Fighter (IDF) leading edge flap actuation system (LEFAS) development and production, the Rockwell/MBB X-31A LEFAS flight test program, and the F-16 Fighting Falcon LEFAS production and deployment support. He co-patented a multi-fuseable shaft (high performance drive train device). Additionally, Mr. Fulton has over 20 years of programming experience as a private programmer and developed SuperSMITH® Visual, WeibullSMITH™, LogNormSMITH™, Normal+SMITH™, Visual*SMITH™, BiWeibullSMITH™, and MonteCarloSMITH™ analysis software. He received his B.S.M.E. from Georgia Tech and his M.S.M.E. from California State University at Long Beach.

Registration Information:
Course I.D.# 86034
Fees: $1,935; **SAE Members – Classic:** $1,742
Premium: $1,645; **Elite:** $1,548
2.0 CEUs

Understanding AS9100 Rev C Webinar

One, two-hour session

For additional seminar information and to view upcoming open enrollment dates, visit: **www.sae.org/pdevent/WB0958**

This two-hour webinar will provide participants with first-hand explanations and insight regarding the changes found in AS9100:2009 (Rev C). The instructor will begin with an explanation of the overall revision objectives followed by the design specification criteria that each change was required to meet in order to be considered. Because AS9100 incorporates the requirements of ISO 9001:2008, participants will also gain valuable insight into the ISO 9001:2008 amendment. The instructor will then guide participants through the implementation timeline so that each participant acquires understanding and insight into how AS9100 Rev C will impact their organization and their efforts to obtain certification.

Learning Objectives

By connecting with this webinar, you will be able to:
- Summarize the revision objectives for AS9100 Rev C
- Explain the AS9100 revision process and design specification requirements
- Identify the significant changes to AS9100 in Rev C
- Describe the AS9100 Rev C implementation timeline

Who Should Attend

This webinar will benefit any aerospace or defense industry professional or auditor who desires a detailed understanding of AS9100 Rev C in order to implement or audit to the standard.

Webinar Content

- AS9100 Rev C Objectives
  - Scope
  - Incorporating IAQG objectives
- AS9100 Revision Process and Design Specification
  - Understanding the design specification
  - Why changes were made
- AS9100 Rev C Review of Changes
- AS9100 Rev C Implementation Timeline
- AS9101 Rev D Implementation Timeline

Instructor: L.L. 'Buddy' Cressionnie

Mr. Cressionnie is currently the Americas IAQG 9100 Team Lead responsible for maintenance, revision, and clarification of the AS9100 standard. He is active in standards development as a voting member of the US Technical Advisory Group (TAG) to ISO/TC 176 which writes ISO Quality Management System standards. He serves on the US TAG Interpretations Committee and is the Aerospace Sector Liaison to the US TAG. Mr. Cressionnie represents Lockheed Martin in these roles where he works in the Aeronautics Business Unit, a 31,000 employee operation across nine sites. He led the implementation of AS9100/ISO 9001:2000 standards and quality process area for Capability Maturity Model Integration (CMMIÂ®) at Lockheed Martin Aeronautics into a centralized, integrated quality system. Buddy Cressionnie is an ASQ senior member with quality manager and quality auditor certifications. He is a certified RABQSA aerospace experienced auditor and International Register of Certified Auditors (IRCA) lead auditor for ISO 9001 and ISO 14001. Buddy Cressionnie received his MBA degree from Texas Christian University and Bachelor of Science in Engineering from the University of Florida.

Registration Information:
Course I.D.# WB0958
Fees: 245; **SAE Members – Classic:** $221
Premium: $208; **Elite:** $196
0.2 CEUs

Design of Experiments (DOE) for Engineers Webinar

Six, two-hour sessions

For additional seminar information and to view upcoming open enrollment dates, visit: **www.sae.org/pdevent/WB0932**

Design of Experiments (DOE) is a methodology that can be effective for general problem-solving, as well as for improving or optimizing product design and manufacturing processes. Specific applications of DOE include, but are not limited to, identifying root causes to quality or production problems, identifying optimized design and process settings, achieving robust designs, and generating predictive math models that describe physical system behavior. This competency-based webinar utilizes a blend of reading, discussion and hands-on to help you learn the requirements and pre-work necessary prior to DOE execution, how to select the appropriate designed experiment to run, DOE execution, and analysis of DOE results. You will experience setting up, running, and analyzing simple-to-intermediate complexity Full Factorial and Partial Factorial experiments both by hand and using computer software. You will also set-up and analyze Robust/Taguchi and Response Surface experiments utilizing computer software. Each participant will receive a 30 day Minitab™ product trial copy for use in the webinar. Due to the nature of the webinar format, each participant will be expected to dedicate approximately one hour to complete "homework" and/or short reading assignments in preparation for each session.

Learning Objectives

By connecting with this webinar, you will be able to:

- Determine when DOE is the correct tool to solve a given problem or issue
- Select the appropriate DOE experiment type (DOE Goal) for a given application
- Set up simple Full Factorial DOEs by hand, using cube plots
- Set up and analyze any Full Factorial DOE using Minitab
- Identify appropriate partial factorial design(s) based on one's application
- Set-up and analyze Partial Factorial DOEs, simple Robust Design (Taguchi) DOEs, and simple Response Surface DOEs using Minitab
- Recognize the structured process steps recommended when executing a DOE project

Who Should Attend

This webinar will benefit engineers involved in product design and/or optimization; process design and/or optimization; quality improvement efforts such as defect elimination, warranty avoidance or similar initiatives; and technicians, analysts and managers who support engineers in these efforts. This course has no specific course prerequisites. However, participants are expected to have some math background, that includes elementary statistics. Since the course includes demonstration and hands-on use of Minitab, participants should have some familiarity with Windows-based personal computer applications.

Webinar Content

Session 1

- Introduction
- What is DOE (with Initial Data Collection Exercise)
- Full Factorial Experiments using Cube Plots
  - Identifying main effect and interaction terms
  - Determining effects for all terms
- Estimating How Much Experiment Data is Enough
- Assignment for Session 2: Review of Web-Based Demo of Minitab - Full Factorial DOE Set-up and Analysis; and Reading, Overview of DOE Statistics

Session 2

- Set up and Analysis of a Full Factorial Experiment using Minitab
- Minitab's DOE Results (High Level Overview of Minitab Outputs)
- Review of Methods for Determining 'Significance'
- ANOVA and Regression Overview
- Assignment for Session 3: Hands-on Exercise in the use of Minitab using Simulator to Generate Data, and Reading on the Structured DOE Process

Session 3

- Review of Exercise Assigned at the End of the Session 2
- Review and Additional Information on DOE Statistics and Interpretation of DOE Output
- Best Practice: The Problem Solving Process
- Best Practice: The Structured DOE Process
- Assignment for Session 4: Reading on Overview of Confounding and Partial Experiments

Session 4

- The Confounding Principle and Partial Factorial Experiments
- How Confounded Occurs in a DOE, including Identity Usage and Resolution
- Setting up Partial Factorial Experiments using Minitab
- Assignment for Session 5: Partial Factorial Exercise using Minitab and a Simulator to Generate Data for the DOE; Reading on Robust/Taguchi DOE

Session 5

- Review of Exercise Assigned at the End of the Session 4
- When Robust/Taguchi DOE is Appropriate
- How Robust/Taguchi DOE is Different
  - Two-Step Optimization Concept
  - Control vs. Noise
  - Importance of Control-by-Noise Interactions
  - Signal-to-Noise (S/N) and Loss Statistics
- Some Taguchi DOE Success Stories (incl. Set-up and Analysis in Minitab)
- Demonstration of Minitab for Setting Up a Taguchi DOE
- Assignment for Session 6: Robust/DOE Exercise using Minitab and a Simulator to Generate Data for the DOE, Reading on Overview of Response Surface Methodology

Session 6

- Review of Exercise Assigned at the End of the Session 5
- When Response Surface DOE is Appropriate
- How Response Surface DOE is Different
  - Box-Behnken Concepts (with Demonstration of Minitab Set-up)
  - Central-Composite Concepts (with Demonstration of Minitab Set-up)
- Class Exercise: Response Surface Set-up and Analysis
- High-level Overview of Other Designs/Application: Plackett-Burman and Mixture
- FAQ Review
- Summary

Instructor: Kevin Zielinski

Kevin Zielinski currently owns and operates Red Cedar Media LLC, a training and corporate communications consulting, design, development and delivery company based in Michigan. Previously, Kevin was Senior Applications Specialist for EDS (including General Motors/EDS and Hewlett Packard/EDS) specializing in technical training delivery, training consulting, courseware design and development, and e-Learning. He has designed, developed and delivered over 40 lecture- and web-based courses attended by General Motors and EDS employees worldwide. Mr. Zielinski has also served as Adjunct Professor for the Wayne State University College of Engineering and WSU/Focus:Hope for many years. His areas of expertise include: e-Learning design and development, Quality Tools and Methods (Design of Six Sigma, Robust Engineering, Design of Experiments (DOE), Statistical Tolerancing and GD&T); Design for Manufacturing and Assembly (DFMA); Engineering

Economics; and Plant Floor Throughput Improvement. Mr. Zielinski has been an instructor for SAE Professional Development since 1990, and is a recipient of SAE's Forest R. McFarland Award (April 2005). He holds a bachelor's and master's degree in engineering from Wayne State University.

Registration Information:
Course I.D.# WB0932
Fees: $915; **SAE Members – Classic:** $824
Premium: $778; **Elite:** $732
1.2 CEUs

Aircraft Cabin Safety and Interior Crashworthiness

Duration – 2 Days

For additional seminar information and to view upcoming open enrollment dates, visit: **www.sae.org/pdevent/C0926**

The certification of transport category cabin interiors requires a thorough understanding of Part 25 Transport Category aircraft cabin interior safety and crashworthiness regulations and compliance requirements. Regardless of whether it is a simple modification, a specialized completion (VIP or VVIP) or airline passenger configuration, engineers, designers, and airworthiness personnel must understand and adhere to these requirements.

This two day seminar will begin with a discussion of Commercial off the Shelf (COTS) test requirements. The instructor will then guide participants through the various cabin interior emergency provisions and their requirements such as supplemental passenger oxygen, emergency equipment, seats, flammability, emergency exits, emergency lighting and escape path markings, and various other cabin interior systems. Additionally, DO-160 environmental, cooling and ventilation requirements will be discussed to provide participants a comprehensive introduction to cabin interior safety and crashworthiness requirements as specified in the CFR Part 25 Airworthiness Standards.

Learning Objectives

By attending this seminar, you will be able to:
- Identify key strategies to managing certification programs effectively
- Recognize cabin safety and design problems in a timely manner so they may be addressed in advance
- Communicate intelligently on the requirements and effectively negotiate with others involved in FAA certification programs
- Interpret and identify the reasoning behind cabin safety rules and regulations
- Demonstrate an understanding of cabin safety and crashworthiness regulations
- Examine and evaluate current cabin safety issues and their solutions through open discussions between instructor and attendees

Who Should Attend

This course is designed for engineering and certification managers, design engineers, airworthiness and certification engineers, program managers, consultants, Federal Aviation Administration designated engineering representatives (DER) interested in gaining interior arrangement authorization added to their delegated functions and authorized areas, and other technical and administrative personnel involved in FAA certification activities.

Seminar Content

DAY ONE
- Introduction to Part 25 Airworthiness Standards Requirements
- Commercial Off The Shelf equipment (COTS) and Super COTS
- Galleys
  - Electrical disconnects
  - Water shut-offs
  - Latches
- Passenger Oxygen and Oxygen Masks
  - Reach (5th percentile female)
  - Quantity and duration requirements
- Emergency Equipment
  - Ditching requirements -- Life rafts; Life vests; Survival kits
  - First aid kits
  - Defibrillators
  - Fire extinguishers
  - Smoke detectors
  - Access
  - Placards
- Seats
  - Dynamic (C127a)
  - Static (C39b)
  - Divans
  - Seat belts and shoulder harness
  - Head strike
  - Oxygen mask requirements
  - Recline and rotations at exit rows
  - Exit access
  - Foot/leg rests
- Beds
- Latches and Secondary Latches
- Placards
  - Visibility; Contrast; Size; Locations
- Flammability
  - Bunsen Burner flammability tests and materials
  - Fire blocking on seat and back cushions and markings
  - Fire containment -- COTS; Lavatory and galley waste containers
  - Smoking and ash trays
- Smoke Detection and Penetration for Cabin Accessible Baggage Compartments

DAY TWO
- Emergency Exit Types and Requirements
  - Floor level
  - Window
  - Flight deck
- Exit Signs and Requirements
  - Size -- Equivalent safety
  - Visibility
  - Types and requirements -- Bulkhead; Locator; Marker
- Aisle Clearance Requirements
  - Cabin main aisles -- Cross aisles
- Exit Passageways
- Emergency Lighting Systems
  - Luminosity tests -- Cabin color contrast
  - Fuselage transverse separation
  - Emergency Escape Path Markings (EEPM) -- Luminous; Incandescent; Visibility; Seat baggage bars
- Crew Areas
  - Crew assist space
  - Crew assist handle
  - Crew visibility
  - Crew rest area
  - Oxygen
  - Communication
- Flight Deck Door

KEY
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- Cabin Doors and Curtain Dividers
- Ordinance Signs
  - Visibility
  - Legibility
- Cross Aisle Visibility
- Passenger Address (PA) System
- Cabin Hand Sets and Egress Issues
  - Constant retention cord reels
  - Ratcheting
- EMI/RFI Tests
- DO-160 Environmental, Cooling and Ventilation Requirements
- Lithium Ion batteries
- Water systems

Instructor: Ken Farsi

Mr. Farsi is currently the VP of Engineering and ODA Administrator for Dassault Aircraft Services in Wilmington, DE, where his responsibilities include oversight of engineering groups and practices at all Dassault Aircraft Services locations. He is an FAA Designated Engineering Representative (DER) with Interior Arrangement and Compliance Inspection, as well as Aircraft Loading Document approval authority on Part 23 and 25 aircraft.

Mr. Farsi has taught aircraft certification and Federal Aviation Regulations as an Adjunct Instructor at Northrop-Rice Aviation Institute of Technology in Los Angeles, and Aircraft Systems at San Mateo Community College in San Mateo, California. He has participated in and managed FAA certification programs for major U.S., European, Chinese, and Australian airlines as a consultant. Along with a Bachelor of Science in Aircraft Maintenance Engineering Technology from Northrop University, Mr. Farsi has participated in graduate studies in Aerospace and Aviation Operations and Management at Embry-Riddle Aeronautical University. He holds FAA Airframe and Powerplant as well as Private Pilot Certificates.

Registration Information:
Course I.D.# C0926
Fees: $1,225; **SAE Members – Classic:** $1,103
Premium: $1,041; **Elite:** $980
1.3 CEUs

New ARP4754A and the Guidelines for Development of Civil Aircraft and Systems

Duration – 2 Days
For additional seminar information and to view upcoming open enrollment dates, visit: www.sae.org/pdevent/C1118

ARP4754A substantially revises the industry guidance for the development of aircraft and aircraft systems while taking into account the overall aircraft operating environment and functions. This development process includes validation of requirements and verification of the design implementation for certification and product assurance. ARP4754A provides the practices for showing compliance with regulations and serves to assist companies in developing and meeting its own internal standards though application of the described guidelines. This two day seminar will provide attendees with an in-depth presentation of the guidelines introduced in the revised recommended practice for aircraft and systems development as well as the critical concepts used in aircraft and systems development processes for certification. The aircraft/systems development process and its interactions with the safety, hardware development and software development processes will be discussed along with the incorporated changes, with special emphasis on new material and development concepts. Additionally, the relationship and key interactions between the aircraft/system guidance material established in ARP4754A and the guidance material in DO-254 for hardware and DO-178B for software will be reviewed to ensure attendees gain insight into the expectations being established for aircraft certification.

In addition to the seminar handout, a copy of the ARP4754A: Guidelines for Development of Civil Aircraft and Systems will be provided to each attendee.

Who Should Attend

This seminar is designed for engineers and other key personnel working in the design, development, and safety assessments of aircraft and aircraft systems.

Learning Objectives

By attending this seminar, you will be able to:
- Indentify the changes between the legacy ARP4754 and ARP4754A,
- Explain the aircraft/systems development process and its interaction with the safety assessment process,
- Identify the key aircraft/systems development processes and their interrelationships,
- Discover and be able to apply new guidelines on Functional and Item Development Assurance Levels (FDAL & IDAL)
- Apply the new guideline material within your own company context.

Course Content

DAY ONE
- Introduction
  - Overview of seminar material
- ARP4754A Development History
  - How we got here.
  - Who contributed to the revision?
- ARP4754 to ARP4754A Change Highlights
  - Chapter by chapter change review
- Aircraft / Systems Development Process
  - Overview of Process
  - Discussion of Interactions with safety processes
  - Discussion of Interactions with hardware and software development processes
- Integral Processes
  - Safety Assessment
  - Development Assurance Level Assignment

DAY TWO
- Integral Processes
  - Requirement Management
  - Implementation Verification
  - Configuration Management
  - Process Assurance
  - Certification / Regulatory Authority Coordination
- New Guidance – FDAL & IDAL Examples
  - Definitions
  - Assigning appropriate levels
- New Guidance – System Development Objectives
  - Appendix A Overview
- AIR6110 – Example Application
- Summary and Review
  - Review of presented material
  - Question and Answer

Instructor Name: Eric M. Peterson

Mr. Peterson is currently Vice-President of Systems and Safety for Electron International, Inc. He has over 35 years experience in aerospace management, system design and analysis, development of hardware and software, and safety assessments for commercial and military flight critical avionic and fly-by-wire system applications. He is also an inactive Systems and Equipment DER with a software endorsement. Mr. Peterson serves as vice-chairman of the SAE S-18 Aircraft & Systems Development and Safety Assessment committee and has provided key contributions to ARP4754A, ARP 4761, and ARP 5150. Mr. Peterson is also a member of the SAE AeroTech General Committee and has served as the Technical Program Chair for a number of SAE conferences. In addition, he is the recipient of the SAE Forest R McFarland Award for outstanding contributions to the SAE Engineering Meetings Board and is also the recipient of the SAE Outstanding Contribution Award for his work in the development of SAE Technical Standards. Mr. Peterson received his B.S. in Electrical Engineering from Montana State University.

Registration Information:
Course I.D.# C1118
Fees: $1,215; **SAE Members – Classic:** $1,094
Premium: $1,033; **Elite:** $972
1.3 CEUs

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