CoatingConnections

Aerospace Coatings, Composites and Corrosion Control:
Materials, Conformance, and Applications
ACCT-1986

Aerospace coatings require high performance and long-term durability. Often the type of coatings and substrates are specified and mandated by the end users who are usually military or commercial aviation companies. The objective of this applied workshop is to offer a sound assessment of the latest developments in materials, application methods, and process selection. The workshop will focus on material properties, both coatings and substrates, their application, and design of a high performance and environmentally compliant coating operation.

WHO SHOULD ATTEND?

All aerospace manufacturing and maintenance personnel: Military and commercial aerospace engineers and contractors dealing with functional, protective coatings and corrosion prevention technology; process, design, and specification engineers, quality control, technical service, and approval managers. The course is appropriate for current users with limited to very good knowledge of coatings operations, which need or want to learn fundamentals, current trends, and new coating application and process technologies.

BENEFITS OF ATTENDING:

- Develop an overall understanding of coatings, substrates, and and corrosion prevention methods and processes.
- Gain valuable understanding of the durability of coatings and corrosion phenomena.
- Learn how to prevent corrosion by the systems approach.
- Learn how to reduce costs by implementing more efficient processes and judicious selection of materials.
- Receive unbiased technical opinions on what works, what does not, and why.
- Reinforce your mastery of troubleshooting and problem solving capabilities.

Course Outline

- **Aerospace Coatings**
  - How to engineer the outcome
  - Corrosion of aircraft metals
  - Chrome-free technologies: availability and performance
  - Protective exterior and interior coatings
  - Coating composites, how and why they are different from coating metals?

- **Adhesion of Coatings**
  - What is adhesion?
  - Requirements for good adhesion
  - Adhesion to aluminum alloys used for aerospace applications
  - Methods of promoting and maintaining adhesion
  - Effect of adhesion on the durability and corrosion resistance of coatings

- How to measure and assess adhesion?

- **Surface Pretreatment**
  - Surface nature and characteristics
  - Reasons for, and benefits of, surface pretreatment
  - Why and how surface treatment governs corrosion control on aircraft
  - How to select a proper surface treatment process
  - Selection and application of primers, adhesion promoters and corrosion inhibitors
  - Surface cleaning
  - What is clean, what is not?
  - Mechanical and physical treatments
  - Conversion coatings
  - Anodizing treatment of aluminum

- **Functional and Decorative Plating**
  - Performance of chrome, copper, nickel, zinc, electroless nickel, High Velocity, Oxygen Fueled (HVOF) and alloys
  - Corrosion protection via plating

- **How to Design for Corrosion Control**
  - Material selection
  - Properties of metals used for aerospace application
  - Which metals corrode, and why
  - How to control corrosion with coatings
  - Process variables
  - Structural design
  - Inspection methods
  - Intact and non-intact protection methods

- **Corrosion and Corrosion Control**
  - Fundamentals of corrosion and corrosion control
  - Why do metals corrode?
  - Corrosion of dissimilar metals and its management
  - Corrosion types and mechanisms
  - Avoiding corrosion through structural design
  - Corrosion control of dissimilar metals and composites on aircraft
  - Corrosion of aluminum alloys used in aircraft
  - Corrosion of ferrous metals
  - Methods of preventing corrosion with surface treatments and coatings
  - The effect of coatings variables on corrosion

- **Corrosion Protection by Coatings**
  - How coatings protect, and why they fail
  - Factors affecting corrosion protection by coatings
  - Selecting coatings for corrosion protection (commercially available)
  - The effect of coating types and application on corrosion prevention performance
  - The effect of coating application variables: film thickness, cure, and temperature
  - Approaches for replacing Chromium (IV)-containing coatings
  - Chromium-free coating types, processes, and application methods
  - Established guidelines for using chrome-free coatings

- How to assess the corrosion resistance of chromium-free coatings
- Approaches for preventing corrosion using old and new technologies
- Methods of evaluating corrosion protection of coatings

- **Selection, Properties, and Application of Liquid Organic Coatings**
  - Film formation
  - What is cured, what is not? How is cure measured?
  - The impact of processing and coating quality on film performance
  - Coating types and properties
  - Selecting compliant liquid coatings
  - Advanced technologies
  - Possible service life prediction
  - Recent developments and future trends

- **Coating Composites and Engineering Plastics**
  - Working with composites and engineering plastics
  - What is a "composite"? What is an engineering plastic?
  - Thermoset and thermoplastic materials
  - The differences between coatings for prepreg, infusion and thermoplastic processes
  - Aerospace grade composites and engineering plastics
  - Nature, types and coat-ability of composites and plastics
  - Surface treatments for composites and plastics
  - Special considerations for coating plastics: what to watch for
  - Factors affecting application methods and coating durability
  - Selection of coatings for composites and plastics
  - Coating application and troubleshooting
  - Evaluation of coatings of composites and engineering plastics
  - Performance of coatings on composites and plastics

- **Testing and Evaluation**
  - What do test methods really mean?
  - Dissecting a typical military and commercial aerospace test method
  - How to assess the applicability of test methods
  - How to apply standard deviations
  - Removing ambiguities from Adhesion and Corrosion testing
  - Interpretation of test results and justification for "go" or "no go"
  - Non-destructive evaluation
  - Correlating test results to "real world performance"

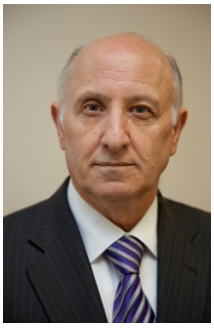
- **Powder and Waterborne Coatings**
  - Property comparison of conventional, waterborne and powder coatings
  - Current status of powder and waterborne coatings
  - When and where to use powder and waterborne coatings
  - Advantages and limitations
  - Selecting powder and waterborne coating and application methods
  - What does it take to convert to powder or waterborne coating
  - Performance and troubleshooting

- **Coating Removal Processes**
  - Coating removal Technologies

- How to select coating removal materials and techniques
- Methods and mechanisms of coating removal
- Physical and chemical methods of coating removal
- Application time, temperature and pressure requirements

Instructors

Dr. J. Baghdachi



Dr. J. Baghdachi is the President of Innovative Technical Systems Corp. and is a Professor/Director at Eastern Michigan Univ., Coatings Research Institute. He has been actively involved in coatings and plastics technology, their applications and the science of adhesion and corrosion for over 30 years. As an industry consultant he has been conducting workshops on coatings and paint, corrosion control, color control, composites and plastics, and the adhesives bonding technology since 1987. He is the author of seven technical books; 122 technical papers and holds 48 patents. Prior to his current positions, Dr. Baghdachi was on the technical staff of BASF Corp., Dupont, and ARCO Chemical Company. He received his BS. and MS. in Chemistry from the University of Tennessee and a PhD. in Chemistry from the University of Mississippi and worked as a post-doctoral fellow at the University of Massachusetts.

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Richard A. (Dick) Lofland retired from Boeing in January 2005 after 43 years. Prior to Boeing, he worked with Hughes Helicopters Inc. and McDonnell Douglas Helicopter Systems. During that time he served as general supervisor of final assembly of the prototype Apache Helicopters, department manager of the Hughes Helicopter Inc. Engineering R&D Composite Laboratory, and senior program manager of the Intercomponent Work Department. For the last 12 years, Dick served as program lead for environmental and R&D projects within the Materials Process and Standards Department at Boeing. Currently, he serves as president of Richard Lofland and Associates, where he deals with composite applications on aerospace products. Dick received his BS degree in professional aeronautics and a MAS degree in aeronautics and aviation/aerospace management from Embry-Riddle Aeronautical University in Phoenix, AZ.