Scheduled for "Pre-Week"

Introduction to Electroplating & Surface Finishing
Thu & Fri, 8 a.m.–5 p.m., Jan. 21–22
This course serves as both an introduction to the industry and as a refresher course in chemistry and algebra. Other subjects covered are electricity, electrochemistry, types of parts plated & finishing cycles, plating equipment/processes, use of the Hull cell & other plating cells to test solutions, plating processes, and basics of corrosion.

Light Metals Finishing Course
Thu, Fri & Sat, 8 a.m.–5 p.m., Jan. 21–23
This course covers finishing processes for light metals, specifically aluminum, magnesium and titanium. It covers corrosion, metallurgy, mechanical finishing, equipment considerations, cleaning/preparation processes, etching/chemical milling, hard coating, chromic and sulfuric acid anodizing, and more.
Instructors: Pat Scalera, CEF & Lawrence R. Carlson, CEF, Henkel Surface Technologies, Madison Heights, MI

YEAR 2000 Computer Crisis—RUY2KOK™?
Fri & Sa, 8 a.m.–5 p.m., Jan. 22–23
Do you have complete control over your millennium computing problems? Are you absolutely positive? AESF is joint-venturing with CWE2 in a new course that will help your metal finishing shop be able to identify, evaluate and overcome its Year 2000 risks. In this two-day course, Day 1 will focus on the problem generically (the technical nature of the problem and the operational, legal and financial risks if your company doesn't address the issue); and Day 2 will focus on problems specific to the surface finishing industry. At the completion of the course, you'll walk out the door with an action plan to implement as soon as you get back to your company.

Society of Manufacturing Engineers Fundamentals of Industrial Painting & Powder Coating Processes*(Course #2944899)*
Monday & Tuesday, January 25–26, 8 a.m.–5 p.m.
This two-day course is designed to increase your knowledge of modern industrial coatings, processes, chemistry, capabilities and functionality. It will be presented in an informal atmosphere, where you will be able to get answers to your specific questions and compare current methods and applications with those implemented by others in the industry.

If you are contemplating changes to your coatings, equipment or are looking to improve your coatings film quality, this course will provide you with objective information upon which you can base a decision.

Past participants of this course have included plant support managers, applications specialists, process engineers, machining managers, materials engineers, manufacturing engineers, and many others who are involved in the industrial painting and powder coating process.

To register, call SME at 1-800/733-4763.
Please be prepared to give the course registration number (2944899).

Courses & Workshops for "Pre-Week" & AESF Week

Training Course in Electroplating & Surface Finishing
Mon–Thu, 8 a.m.–5 p.m., Jan. 25–28
A more advanced study of technologies, this course covers 22 subjects, such as: electricity, cleaning, electrochemistry, electroless plating, filtration & carbon treatment, corrosion, chromate conversion coatings, phosphating, pollution prevention, metallurgy, anodizing, alloy plating and rinsing, as well as nine commonly used plating processes (Ag, Au, Pd, Ni, Zn, Cu, Sn, Sn-Pb). AESF's optional certification exam that leads to the designation of Certified Electroplater-Finisher (CEF) is given at the conclusion of this course.

OSHA Safety & Compliance Workshop
Wed & Thu, 8 a.m.–5 p.m., Jan. 27–28
This workshop is sponsored by AESF's OSHA Committee. It covers in easy-to-understand terms OSHA training requirements, hazard assessment, personal protective equipment, hazard communication, bloodborne pathogens, permit-required confined space control, record-keeping, control of hazardous energy, process safety management of highly hazardous chemicals, first aid & medical surveillance, prevention of heat stress, and fall protection & safety standards.

New! Innovative Pollution Prevention Practices
Thu & Fri, 8 a.m.–5 p.m., Jan. 28–29
This course incorporates pollution prevention information developed through a partnership between the office of the U.S. EPA and the AESF, as well as materials from AESF's former "Innovative Recycling" course. It will help shop owners and managers learn new practices in pollution prevention so they may benefit: (1) By reducing chemical costs associated with finishing; (2) by reducing chemical costs associated with waste treatment; (3) by decreasing the regulatory burden through better environmental control; and (4) by helping provide good finishing services through innovative, cost-effective technologies.
Instructors: Dr. Fred Reinhard, CH2M Hill, Eagan, MN & Derek Vachon, Water Technology International Corp., Burlington, Ontario, Canada

Electroforming Course
Thu & Fri, Jan. 28–29
This course, developed jointly by the Nickel Development Institute (NiDI) and the AESF, is designed to provide attendees with a thorough understanding of electroforming and its many practical applications.
Course Organizer & Chairman: *Ron Parkinson, Nickel Development Institute (NiDI), Toronto, Ontario, Canada*

Thursday, 9 a.m.–5 p.m.
BASIC ELECTROFORMING TECHNOLOGY
9 a.m.—Introduction to Electroforming
Ron Parkinson, NiDI Toronto, Ontario, Canada
9:30 p.m.—Selecting the Metal for Electroforming; Electrodeposition Principles; Electrolytes: Composition, Operation & Control
Dr. Donald L. Snyder, Atotech USA Inc., Rock Hill, SC & Dr. George A. DiBari, consultant, Chatham, NJ
11:00 a.m.—Important Deposit Properties & How to Measure Them; Mechanical Properties of Electroformed Metals
Glenn Malone, ENI, Huntsville, Alabama
Noon - Lunch
MANDRELS & ELECTROFORMING APPLICATIONS
2 p.m.—Types, Design & Preparation of Mandrels
Dr. George Di Bari, consultant, Chatham, NJ
3 p.m.—Compact Discs, Holograms & Screen Products
Ron Parkinson, NiDI, Toronto, Ontario, Canada
4 p.m.—Electroformed Molds & Other Tools
Instructor TBA

Friday, 9 a.m.–4 p.m.
MANDRELS & ELECTROFORMING APPLICATIONS
9:00 a.m.—Aircraft/Aerospace Components
Glenn Malone, ENI, Huntsville, AL
10:30 a.m.—Metal Foil & Foam, Seamless Belts, Currency & Other End-Uses
Ron Parkinson, NiDI, Toronto, Ontario, Canada
11:30 a.m.—Questions & Answers
Noon - Lunch
Special Electroforming Topics
Session Organizer & Chairman: *Dr. George DiBari, Consultant, Chatham, NJ*
2 p.m.—SPECIAL TOPICS OF CURRENT INTEREST
Developing an Electroforming Application & Process
Berl Stein, Reflexite PTC, West Henrietta, NY
Electroformed Art—From Plaques to Sculptures
Dr. Ariel Schrodt, Dover Industrial Chrome Inc., Chicago, IL
Electroforming in Europe
Dr. A.C. Hart, NiDI consultant, Birmingham, England
Update on the LIGA Process
William D. Bonivert, Sandia National Laboratory, Livermore, CA
3:30–4 p.m.—Panel discussion

Regulatory Compliance Workshop
Thu & Fri, 8 a.m.–5 p.m., Jan. 28–29
This course provides detailed compliance information on RCRA, the Clean Water Act, the Clean Air Act, Superfund, SARA, and other compliance issues. Learn from experts when and how to comply. Plus, learn how to make those tricky calculations for TRI reporting. The textbook used in this workshop is the Guidance Manual to Environmental Compliance, which was produced under an EPA grant through the efforts of the AESF, NAMF and the MFSA.
Instructors: Joelie Hill, CEF, Scientific Control Laboratories, Chicago, IL & Jeffrey Lord, CEF, The Black Company Environmental, Copley, OH

Wastewater Treatment & Control Workshop
Thu & Fri, 8 a.m.–5 p.m., Jan. 28–29
This workshop provides wastewater treatment operators with much of the knowledge necessary to become licensed operators. It covers sampling/preservation of samples for compliance purposes; optimizing rinsing to minimize wastewater; treatment of wastes (cyanide-bearing, chromium-bearing, metals & oily wastes), advanced methods for conventional & chelated wastes; solid/liquid separation; troubleshooting; and recycle/recovery methods.

Certified Electroplater-Finisher (CEF) Exam
Fri, Jan. 29, 8–10 a.m.
In conjunction with its educational courses, AESF sponsors a voluntary certification program. An individual who successfully passes the appropriate examination will earn the designation "Certified Electroplater-Finisher" and is entitled to use the initials "CEF" after his or her name, to denote competency in the industry. The certification program is completely optional.

The SVC's courses are designed to complement each other. A discount of 15 percent of the total fee applies when registering for more than one course. Fees are discounted to members of SVC and AESF.

Short Course: SVC V-101

An Introduction to Vacuum & Plasma Technology For PVD Processing

Monday, January 25 • 8:30 a.m. – 4 p.m.

The deposition environment is an important aspect of PVD processing. Using a vacuum environment allows the control of gaseous contamination in the chamber and of the gas density during deposition. A plasma, which is partially ionized low-pressure gas, is used in many PVD processes. Plasma provides ions that can be accelerated to high energies and "activates" reactive gases for reactive PVD processes.

Plasma is most commonly generated using a DC diode configuration—often with magnetic confinement. In order to have a good plasma system, the system must first be a good vacuum system. In order to have a reproducible deposition environment, the system-related contamination must first be controlled by appropriate techniques. The design and construction of vacuum systems and plasma systems will be discussed.

This is an entry-level course to acquaint the students with ways of generating the vacuum and plasma environments used for PVD processing. It will describe the important aspects of the design, construction, operation and maintenance of various PVD equipment.

Course Content

• Introduction—PVD processes, important parameters, atomic & molecular structure, some units, applications of vacuum & plasmas
• Gases & vapors—properties, origins, vacuum gauges, RGAs, gas flow, conductance, gas pressure—units & partial pressures; Ideal Gas Law, pumping gases & vapors; water vapor, a special problem
• Vacuum systems—system configurations, removable & non-removable surfaces, conductance, pumping speed, components, pumps, valves, feedthroughs & plumbing; materials & fabrication; system design—design trade-offs & fail-safe design; initial cleaning & assembly
• Vacuum system operation & characterization; pump downtime; crossover pressures, contamination—gases, vapors & particulates; leak detection & leak rates; system conditioning problems with use, cleaning & stripping
• Plasmas—properties, plasma chemistry, plasma generation, magnetic & electric field effects, plasma regions, plasma activation
•Plasma enhancement & plasma sources—inert & reactive gas plasmas, ion beam sources, post-vaporization ionization
• Plasma systems—plasma-surface effects, electrode configurations, gas injection, gas composition monitoring, gas flow control, gas density variations, plasma property monitoring, contamination in plasma systems, power supplies
• Fixtures—major removable surface, design & fabrication, electric field configurations, biasing, cleaning & stripping, handling & storage
• Vaporization sources—type (evaporation, sputtering & arc), mounting, maintenance.

The course fee includes the text, *Handbook of Physical Vapor Deposition (PVD) Processing* by Donald Mattox (Noyes Publications, 1998). This book covers all aspects of PVD process technology, from characterizing and preparing the substrate material, through the deposition process and film characterization, to post-deposition processing.

Instructor: Donald Mattox, SVC Technical Director
Fee: $395 (includes textbook)

Short Course: SVC C-102

Introduction to Sputtering & Evaporation

Tuesday, January 26 • 8:30 a.m.–4 p.m.

This is an introductory course for people who would like to become familiar with the principles of evaporation and sputtering. The basic physical and chemical processes that occur at the source and the factors that control the film properties will be described for both technologies. Typical applications will be discussed and used to contrast the advantages and disadvantages of the two methods.

Course Content

• Evaporation
• Vapor pressure & deposition rates
• Evaporation sources
• The control of film composition, structure & uniformity
• Typical applications & scale-up issues
• Sputtering
• Basic description of plasmas
• Magnetron sputtering
• RF sputtering & reactive sputtering of insulators
• The control of film properties
• Typical applications & scale-up issues

Instructor: David Glocker, Isoflux, Inc.
Fee: $295

Short Course: SVC/V-205

Cleaning & Contamination Control for PVD Processing

Wednesday, January 27 • 8:30 a.m. – 4 p.m.

Contamination on the substrate surface and in the deposition system can be detrimental to the properties of films formed by PVD processing. Contamination can be in the form of particulates that create pinholes in the films or surface layers that affect nucleation, interface formation, and adhesion of the films, or gases and vapors in the deposition environment that affect the growth and chemical composition of the deposited film. The contamination can be substrate-related, substrate-preparation-related, external-processing-environment-related, storage- and-handling-related, film-deposition-process-related and/or deposition- system-related.

This course will describe the types and origins of contaminants, and the means for eliminating or controlling the type and amount of contamination from each of the sources. Particular emphasis is given to large-scale high-volume vacuum-based and plasma-based processing. Engineers, technicians and operators involved in PVD production and vacuum/plasma system operation and maintenance should take this course.

Course Content

• Introduction—PVD processes & equipment, film growth, film structures, substrate surface effects, contamination effects; documentation
• Contamination—types & origins, detection & identification, recontamination
• Substrate surfaces, fixtures & vacuum system surfaces; materials, surface treatments, outgassing & diffusion
• External processing environment—contamination control—gases, vapors & particulates; handling, storage & transportation of cleaned parts
• External cleaning—gross cleaning & stripping, specific cleaning, rinsing & drying, outgassing, component assembly, process integration
• System-related contamination—removable & non-removable surfaces, "isolation" designs, origin of contaminants, fail-safe designs, system conditioning, changes-with-time; cleaning & maintenance
• Process-related contamination—particle, gas & vapor generation; thermal effects, vaporization effects, plasma-surface interactions, arcing
• Contamination of processes surfces; packaging & handling; next processing stage

The course fee includes the text, *Handbook of Physical Vapor Deposition (PVD) Processing* by Donald Mattox (Noyes Publications, 1998). This book covers all aspects of PVD process technology, from characterizing and preparing the substrate material, through the deposition process and film characterization, to post-deposition processing.

Instructor: Donald Mattox, SVC Technical Director
Fee: $395 (includes textbook)

To register, contact the SVC:

71 Pinon Hill Place NE
Albuquerque, NM 87122-1914
Phone: 505/856-7188
FAX: 505/856-6716

Discount fees

V-101 & C-102 = $595
V-205 & C-102 = $595
V-101 & V-205 = $695 *(one book only)*
V-101, C-102 & V-205 = $895 *(one book only)*

Working Meeting:

U.S. EPA/IPC Design for Environment Alternative Surface Finishes Project

4:30–6 p.m., Room: Monterrey 3
Wednesday, January 27

The Institute for Interconnecting and Packaging Electronic Circuits (IPC) and the U. S. Environmental Protection Agency's (EPA) Design for the Environment (DfE) Program have formed a voluntary partnership to promote pollution prevention and risk reduction in the printed wiring board (PWB) industry. Currently, the DfE PWB Project is evaluating the human health and environmental risk, performance and cost of lead-free surface finishes that can replace the hot-air solder leveling process (e.g., immersion silver, immersion tin, OSPs, immersion palladium and electroless nickel/immersion gold). A performance demonstration has been conducted, and the project partners are now conducting a comparative risk characterization. In order to accurately assess occupational exposures associated with the technologies being studied, this open project meeting is being held to obtain industry feedback on workplace practices data obtained through an industry survey and assumptions to be used in estimating exposures. We will also present the preliminary results of the performance demonstration. Anyone interested in PWB surface finishes is encouraged to attend and participate in the meeting.

Contacts: Kathy Hart & Dipti Singh, U.S. EPA & Jack Geibig, University of Tennessee Center for Clean Products & Clean Technologies