

# 1999 Aerospace/ Airline Plating & Metal Finishing Forum



April 20-22, 1999 Jacksonville, Florida  
Prime F. Osborn III Convention Center

## Tuesday, April 20, 1999

### 9 a.m.—Welcome

#### 9:15 a.m.—Keynote Address

Captain Gary S. O'Neill, Executive Officer, Jacksonville Naval Aviation Depot, Jacksonville NAS, Jacksonville, FL

#### 9:45 a.m.—The Chromium Replacement Program at Boeing—Long Beach Division

Mary Ann Forrest-Woodward, Boeing—Long Beach Division, Long Beach, CA

This paper will present the status of the chromium plating replacement program at Boeing. The coatings evaluated were detonation gun (D-gun), super detonation gun (Super D-Gun) and high velocity oxyfuel (HVOF). Preliminary and final results will be reported in the following areas: Corrosion, hydrogen embrittlement, wear, fatigue, bend testing, bond strength, metallography and fatigue.

### 10:15-10:30 a.m.—Coffee Break

#### 10:30 a.m.—Can a Plating Shop Operate without Vapor Degreasers—Even for Wax Coatings?

Carol Eden, United Airlines, San Francisco, CA  
As we all know, aqueous cleaning is here to stay. But what can be done to remove the wax coatings that have been used for masking during the plating and stripping operations? The United Airlines Plating Shop has been perplexed with this dilemma for years. Necessity is often the mother of invention. When one has a vapor degreaser that breaks down at six-month intervals and the back-up degreaser can't handle the load, alternatives had to be discovered. This paper will reveal alternative methods used for complete wax removal, their practicality, and the hazards and concerns of one specific replacement that is currently being used at United.

#### 11 a.m.—Complete Chrome-free Pretreatment Process for Aluminum

Andrew J. Day, Brent International, Plc., Ridgeway, Iwer, Bucks, UK

A chrome-free product has been developed for cleaning, etching, desmutting and conversion coating processes for aerospace applications. The process includes high-performance alkaline cleaners and non-chrome etch and desmutting solutions for use prior to anodizing or chemical conversion coating. Silane-based, metal-ion-free conversion coatings will also be discussed. These materials have given equivalent or superior performance to industry standard chrome-based pre-paint chemical treatments.

### 11:30 a.m.-1 p.m.—Lunch on your own

#### 1 p.m.—Chromium Alternatives Update

M. Klingenberg, B. Manty & D. Schario, Concurrent Technologies Corp., Largo, FL  
Concurrent Technologies Corp. (CTC) has been involved with the evaluation and implementation of chromium alternatives technologies over the last five years. During that time, four annual conferences were conducted (Advanced Techniques for Replacing Chromium: An Information Exchange), where vendors, users and potential users discussed their technologies and/

or needs relative to chromium replacement. A paper was written that summarized the alternatives that were presented at these conferences, as well as those investigated by CTC. This paper provides an update on chromium replacement or enhancement technologies, focusing on technologies that have been implemented successfully in industry and the DOD, and highlighting the current areas of research in chromium replacement.

#### 1:30 p.m.—Passivation—Getting the Properties You Want & Need

Dan Englebert, Imagining Enterprises, Inc., South Bend, IN

Many machine shops, purchasing agents and engineers are unfamiliar with the relationship between corrosion-resistant (stainless) steel and chemical passivation. Advanced materials engineers in aerospace, electronics, medical and similar high-tech industries have utilized chemical passivation for many years. Their applications demand the maximum performance from components manufactured from corrosion-resistant steel, and they realize that chemical passivation is one of the most effective methods of achieving the desired results. This paper explains what passivation is and how it is performed, along with the testing to validate its effectiveness. It also explains the different variables to be considered and controlled during the passivation process, as well as the importance of using the cor-



**Keynote Speaker**  
Tuesday, April 20, 9:15 a.m.

**Captain Gary S. O'Neill**  
NADEP JAX Executive Officer

Since 1997, Captain Gary S. O'Neill has served as the Executive Officer of the Naval Aviation Depot in Jacksonville, FL. Originally from Washington, DC, he holds a degree in aeronautical engineering (with honors) from Georgia Institute of Technology. He holds two degrees from the Naval Post Graduate School in Monterey, CA: MS in aeronautical engineering (with distinction) and aeronautical engineer, with a research thesis concerning composite structures.

Capt. O'Neill's flight and maintenance operations experience is extensive. In addition, he has logged more than 1700 flight hours in six different aircraft. His military awards include Meritorious Service (with gold star), Navy Commendation Medal (with gold star) Navy Achievement Medal, Navy Unit Commendation, and Meritorious Unit Commendation.

rect equipment during processing. A few key items to avoid during the manufacturing and/or thermal processing are presented.

2-2:15 p.m.—Coffee break

2:15 p.m.—Overview Briefing: The "New" Joint Group on Pollution Prevention—Integrating & Solving Common Acquisition & Sustainment Needs

Robert Hill, NASA, Kennedy Space Center, FL

The military services, Defense Logistics Agency (DLA) and NASA have co-chartered the establishment of the Joint Group on Pollution Prevention (JG-PP). The JG-PP provides engineering, technical and business services required to identify and accomplish validated pollution prevention projects. Projects will be facilitated through partnerships among industry contractors; affected Army, Navy, Marine Corps and Air Force weapon system program managers and depot process owners; NASA center and enterprise managers; and the Defense Contract Management Command. These partnerships will identify and validate alternatives to HAZMAT's usage. Once engineering authorities have validated an alternative, the industry contractor will utilize the Single Process Initiative (SPI) block change to modify contracts for implementation across all affected systems and components. Depot sustainment maintenance activities will utilize their respective service/agency change mechanism for implementation. JG-PP project findings will be made available to government and industry for future use on pollution prevention opportunities.

2:45 p.m.—TBA

3:15 p.m.—Panel Discussion on HVOF

4-6:30 p.m.—Exhibit Open (Cocktail Reception)

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## Wednesday, April 21

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8 a.m.—Introduction to IVD Aluminum on Aerospace & Commercial Parts Per MIL-C-83488

Howard Little, AAA Plating & Inspection, Inc., Compton, CA

This presentation will be highly illustrated, showing aircraft parts, connectors, fasteners and magnets finished in ion vapor deposited (IVD) aluminum. Specific illustrations will show: Degreasing of parts; aluminum oxide blasting of parts; IVD coating of parts, both in rack coaters, pin rack

and barrel coaters; glass beading after IVD; chromate conversion coating; and option of primer after IVD.

8:30 a.m.—Qualification of HVOF Thermal Spray Coatings as Replacement for Hard Chrome Plating on Aircraft Landing Gear

Bruce D. Sartwell, Naval Research Laboratory, Washington, DC

A project is underway to qualify WC/CO and WC/Co-Cr coatings deposited using the high-velocity oxygen-fuel (HVOF) thermal spray technique as replacements for hard chrome plating that is currently being used in both manufacturing and repair of aircraft landing gear. Numerous Defense Department organizations and private companies are participating in this project. A Joint Test Protocol has been prepared that includes fatigue, corrosion, wear, impact, hydrogen embrittlement, and chemical compatibility testing of the HVOF coatings as compared to hard chrome. Results will be presented for a substantial amount of these tests, as well as the results of rig testing of actual landing gear components from Defense Department aircraft. The development of standards and specifications for the HVOF coatings (which is being executed in conjunction with the SAE Aerospace Metals Engineering Committee) will also be discussed.

9 a.m.—Zero-waste Cadmium Plating for the Aerospace Industry

Mandar Sunthakar, IonEdge Corporation, Ft. Collins, CO

In spite of environmental concerns related to cadmium electroplating, it is extensively used in the aerospace and airline sectors for coating high-strength steels, and the trend is likely to continue. As an alternative, a novel zero-waste cadmium dry plating method has been developed and commercialized. This physical vapor deposition (PVD) method does not use liquids. At the same time, it recycles cadmium in situ to eliminate waste. The quality of the coatings is equal to that of the plated cadmium. Hydrogen embrittlement has been eliminated.

9:30-9:45 a.m.—Coffee break in the Exhibit Hall

9:45 a.m.—A New Process for On-site Repair of IVD Aluminum Coatings

Christopher J. Helwig, Brooktronics Engineering, Valencia, CA

As a replacement for cadmium electroplating, IVD aluminum is certainly one of the most popular. IVD Al coatings are used extensively on airframe components of both

civilian and military aircraft. Until now, there has been no proven method to repair IVD coatings without having to remove the component, strip the old coating and send to a vacuum chamber for re-coating. This paper describes a proprietary brush electroplating process that deposits a corrosion-resistant coating over the existing IVD Al and the base metal. This process is portable and can be used on site without disassembly of most components. This deposit exceeds the corrosion requirements of QQ-P-416 (Electrodeposited Cadmium) and MIL-C-83488 (Coating, Aluminum, Ion Vapor Deposited).

10:15 a.m.—Comparison of Wear Rates Between Chrome Plating & Various HVOF Tungsten Carbide Coatings Applied Against Bearing Materials & Coatings

H.F. Taber, J.R. Shadley, E.F. Rybicki & I. Megat, Department of Mechanical Engineering, The University of Tulsa, Tulsa, OK; & W.A. Emery & J.D. Nuse, Southwest Aeroservice, Inc., Tulsa, OK

Tungsten carbide (WC) thermal spray coatings have had increasing acceptance in commercial aircraft applications. Most of these applications have been driven by the desire to replace chromium electroplate because of environmental and economic considerations. A significant factor that affects the suitability of chromium electroplate and WC thermal spray coatings on aircraft parts is the wear rate of the coating and its mating surface. This paper presents results of wear tests based on the ASTM G77 Block on ring procedures, comparing chrome plating to various WC thermal spray coatings applied against various types of bearing materials and coatings. Residual stresses in the coatings are examined as a wear resistance factor.

10:45 a.m.—Practical Aspects of Aqueous Cleaning at United Airlines: A Four-year Perspective

Douglas B. Wyatt, United Airlines Maintenance Operations, San Francisco International Airport, San Francisco, CA

Aqueous cleaning has replaced solvent-based cleaning operations prior to overhaul cleaning plasma spray and plating operations at United Airlines. In 1995, an innovative spray-wash technique was established that has provided outstanding service. This paper will cover what has taken place and what changes have been made over the past four years of operation. It will also cover types of equipment and size requirements, as well as chemical formulations that meet the desired cleanliness for pre-cleaning, plasma spray and plating operations.

11:15 a.m.-2 p.m.—Lunch in the Exhibit Hall; "Window of Opportunity"

2 p.m.— An Industrial Process with Practically No Free Hydrogen or Oxygen (For Hard-coating & Architectural Anodizing of Aluminum)

W. Corcoran, R. Huebsch & R. Reinhardt, Duralectra Inc.; L. Lemer, Sanford Process Corp.; & Dr. M. Lemer, Tamin Corp., Wellesley, MA  
Straight DC anodizing processes occasion-

ally generate detonating gas, causing explosions over the surface of an electrolyte during a run, thereby creating a hazardous environment. For safety, it is required in Korea and other countries to cover cathodes with entrapping-free-hydrogen bags, still allowing ions to flow through. The 20-year-long industrial experience of the low-voltage-hard coating (fed by the resonant DC+AC power sources) demonstrated that the free-oxygen-and-hydrogen-generation is reduced to levels that eliminate occurrence of hazardous explosions, even in the ex-

treme case when the electrolyte surface is covered with a thick foam blanket. This phenomenon is another industrial justification (along with the 6Vdc-drop of the tank voltage, better colors, etc.) of the arc-free-hypothesis for a low-voltage DC+AC anodizing and hard-coating.

2:30 p.m.— The Impact of RCRA & HSWA on the Aerospace Industry

Edward J. Acosta, New Mexico Environment Department, Santa Fe, NM

The Resource Conservation and Recovery Act (RCRA) was passed in 1976 and established the statutory requirements that are the basis for hazardous waste regulations. The Hazardous and Solid Waste Amendments (HSWA) of 1984 made changes in RCRA that are primarily concerned with the land disposal program. RCRA and HSWA impact metal finishing in the aerospace industry with numerous regulations that affect day-to-day operations. An overview of RCRA and HSWA will be provided with respect to generation, transportation, storage, treatment and disposal of hazardous wastes in metal finishing operations.

3 p.m.—Modular Racking for Automated Electroplating Lines: A Five-year Retrospective

Bradley C. Johnson, Boeing Commercial Airplane Group, Portland, OR

Boeing Portland's A4580's Processing Group made the move to modular racking in its automated plating facility five years ago during its design phase. This paper is a five-year retrospective on the pros and cons of modular racking and the lessons learned during this project. The paper covers the criteria used for the decision to change to modular racking, as well as the long-term effect of implementation of this program. Other issues covered are: Dealing with racking as a "tool," and the use of non-design tools in the aerospace industry.

3:30-3:45 p.m.—Coffee break

3:45 p.m.—Aircraft Depainting

Raymond Williams, U.S. Technology Corp., Canton, OH

There have been many advances in recent years in aircraft depainting. The most extensively used advances have been in soft abrasive blasting, such as plastic media. In excess of 15,000 military aircraft have been successfully depainted using this process. Now commercial aircraft are beginning to utilize this process with abrasives designed specifically for aerospace requirements. This paper looks at the testing and implementation of Mil Spec type 7 starch-based media and how it impacts service

life, flow days composites, thin skins, alclad, aladine, safety and the environment.

4:15 p.m.—Environmental Technology Verification Program Update  
Alva Edwards Daniels, U.S. Environmental Protection Agency & Jim Voytko, CEF, Concurrent Technologies, Largo, FL

The U.S. EPA and Concurrent Technologies are cooperating in a program for the metal finishing industry called the "Environmental Verification for Metal finishing" (ETV-MF) program. This program, in association with EPA's Common Sense Initiative Metal Finishing Sector, is a pilot for verifying innovative, commercial-ready technologies designed to improve industry performance and achieve cost-effective pollution prevention. This paper will describe how the program operates, how program activities are guided by a group of industry stakeholders, and how the program can benefit pollution prevention technology providers and users involved with aerospace and airlines finishing. Current program activities and future plans will be discussed.

4:45 p.m.—Panel discussion on U.S. EPA ETV-MF Project & its application to the aerospace industry

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## Thursday, April 22

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8 a.m.— Conductivity Improvement of Anodic Coatings by Ag Process  
Shi Hua Zhang & Lin Zhang METALAST International, Inc., Minden, NV

Using a patented Ag process, Ag was deposited in the pores of formed anodic coatings to restore the conductivity of anodic film, which otherwise is an excellent insulator. Although the insulating properties of anodic coatings have found broad applications in industry, anodic coatings with a restored conductivity are also attracting interest because of their unique property of fairly good corrosion resistance and conductivity. This paper will focus on the theoretical considerations as to the maximum conductivity that can be approached by the Ag process, taking into consideration two factors—the thickness and the porosity of anodic coatings. The mechanism of the Ag process by AC current will also be presented. Following the theoretical discussion, experimental work will be discussed, including the optimization of process parameters, such as the thickness of anodic coating, Ag processing time, and Ag process voltage. The results of relationship between the surface resistance of silvered anodic coatings and the thickness of anodic coatings will also be provided.

8:30 a.m.— Multiple-step Alternatives to Chromate Passivation

Craig V. Bishop & Dr. Gary Loar, McGean-Rohco, Cleveland, OH

One of the many advantages that hexavalent-chrome-based passivation methods enjoy is that they can be applied in a single step following cleaning or plating. Attempts to eliminate hexavalent chromium have been hampered by the self-imposed constraint of matching this single-step advantage. In this paper, we will explore how a multiple-step paradigm can be used to meet all the of the advantages of hexavalent chromium based on passivation.

9 a.m.— The Latest Developments in Hard Chrome Replacement Using Coatings Applied by HVOF

J.D. Nuse, David A. Somerville & James M. Emery, Southwest Aeroservice, Inc., Tulsa, OK

For the last several years, lab testing and service evaluations have been conducted to evaluate the feasibility of replacing electrolytic hard chrome with tungsten-carbide-based powders applied with high velocity oxy-fuel (HVOF) thermal spray equipment. Largely driven by environmental concerns related to the application and waste disposal from the chrome plating process, increasing evidence suggests that the thermal spray coatings may provide additional advantages in terms of application requirements, service performance and product

life cycle costs. This paper will present some of the latest developments in hard chrome replacement utilizing tungsten carbide cobalt and tungsten carbide cobalt chrome applied by HVOF. This includes test methodologies used by various organizations, as well as in-service testing undertaken by commercial airlines and the military. Issues related to application techniques, surface finishing and coating removal methods will also be discussed.

#### 9:30 a.m.—Aircraft Engine Parts Cleaning

Carlos H. Peres, PROCECO Ltd., Montreal, Quebec, Canada

This paper will review the introduction of new cleaning equipment at the engine overhaul shop of a major U.S. airline. Low reliability of the old equipment, higher anticipated production levels, and the need to provide maintenance traceability prompted the complete replacement of the old equipment. Two new immersion tank lines, plus one turntable and one belt conveyor washer were installed in 1998. After stripping down the engine, parts or components are first pre-cleaned in a turntable-type power spray washer. Depending on the part (cold- or hot-end related), it is then processed in one of the two tank lines. A PC-based system controls and records process parameters of both lines and ties them to the batch in process. A belt-type conveyor washer is used for cleaning parts that are subject to repairs. The new equipment provides a significant improvement to the cleaning operation, meeting production levels, and providing increased up-time and maintenance traceability.

#### 10 a.m.—Electrodeposition of Thin Films of Zn-Ni-X (X = SiO<sub>2</sub>, P, Ce, Mo) Ternary Alloys onto Chemically Modified Steel Alloys to Prevent Corrosion & Hydrogen Embrittlement

Branko N. Popov & Ralph E. White, Department of Chemical Engineering, University of South Carolina, Columbia, SC

The feasibility of using Zn-Ni-X (X=SiO<sub>2</sub>, P, Mo, Pb) coating as a possible replacement for cadmium on steel was determined. The inhibition of hydrogen evolution reaction (corrosion) and hydrogen permeation by Zn-Ni and Zn-Ni-X electrodeposits on steel were compared with the rates for bare iron, zinc electrodeposited on iron, and nickel electroplated on iron. Ticker Zn-Ni-X ternary alloys inhibited the hydrogen permeation greater than 96 percent as compared to bare iron. A mathematical model was developed and was used to quantitatively estimate the various kinetic parameters associated with hydrogen permeation for both Zn-Ni and Zn-Ni-P alloys under corroding conditions.

#### 10:30 a.m.—Panel Discussion—Finishing Technologies A to Z

#### 11:15 a.m.—Garland Award & Business Meeting

Lunch on your own following business meeting

#### 1 p.m.—Bus boards for tour at Jacksonville Naval Aviation Depot

#### 1:15 p.m.—Bus departs

## Fly into Jacksonville International Airport

### Air Travel Discounts

Get to the Forum for less by calling Conventions in America (CIA) at 1-800/929-4242 and ask for Group #511. You will receive 5–10% off the lowest applicable fares on Delta Air Lines, or the lowest available fare on any other carrier. Take an additional 5% off Delta if you purchase at least 60 days prior to departure. Travel between April 17–25, 1999. All customers of CIA also receive free flight insurance of \$100,000. Avis Car Rental is offering special corporate rates.

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Delta 1-800/241-6760,  
File #118570A

Avis 1-800/331-1212,  
Corporate Account #L176934



## Hotel Accommodations At the Jacksonville Hilton & Towers

While the Forum and Exposition will be held at the Osborn Convention Center, a block of guest rooms is being held for Forum registrants at the Jacksonville Hilton and Towers, the city's newest waterfront, full-service hotel. In 1998, the Hilton was awarded AAA's Four Diamond Award in recognition of service excellence, hospitality and exceptional guest accommodations.

The hotel is conveniently located—only 20 minutes from Jacksonville International Airport and beautiful Florida beaches. A Ruth's Chris Steak House and two additional restaurants are located within the hotel.

The Jacksonville Hilton and Towers is located on the riverwalk overlooking the St. Johns River and is convenient to many north Florida attractions and activities. The Jacksonville Landing, a riverfront marketplace offering shopping and dining, is only a short boat trip from the dock of the hotel. While on the Riverwalk, guests may explore the Jacksonville Museum of Science and History or visit the River City brewing Company, a micro-brewery and restaurant. Historic San Marco is nearby, with outdoor cafes and unique shops. The beaches and day cruises are only a few minutes from the hotel. Championship golf and deep sea fishing excursions are also readily available.

Attendees will use the Jacksonville Peoplemover, which operates from 6:30 a.m.–8 p.m., to get to the Convention Center; 35¢ one way.

### Please make your reservations before the March 18 deadline.

- Be sure to tell hotel staff that you will be attending the 1999 Aerospace/Airline Plating Forum, in order to get the \$119 room rate.
- Contact the Jacksonville Hilton Hotel directly: Phone 904/398-8800; FAX 904/398-5570
- The hotel is located at 1201 Riverplace Blvd., Jacksonville, FL 32207.

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## Chromium Plating For Engineering Applications (Hard Chromium Plating) April 20-21

A Training Course For Jobshops & Aerospace/Airline Rework Facilities

One of AESF's most popular courses will be held April 20-21 in conjunction with the Forum. Perhaps other members from your facility would be interested in taking this course, which is intended for training personnel who work in "hard chrome" plating shops. It has specific benefit for line workers and shop foremen, but can also be of great use to shop owners and managers of hard chromium plating facilities, too.

A special opportunity in the timing of this course is that the students will be able to attend the opening reception of the Exhibit on Tuesday afternoon and enjoy lunch in the Exhibit Hall on Wednesday. This way, they can see new products and equipment,

too—especially those that are specifically used by the aerospace/airline industry.

Course attendees may also register for the tour to the Naval Aviation Depot. Note: Don't delay. Tour registration is limited to 100, and you must register by March 18 to be able to take the tour.

### Course is Particularly Useful to Jobshops, Aerospace & Airline Plating Facilities

A background in chemistry and metallurgy is provided so that the student can better understand the problems involved in plating chromium onto a variety of substrates. Detailed information is provided on analytical control of plating solutions, preparation, masking and polishing operations, and more. Clean Air Act compliance information is also covered, along with equipment design, including scrubbers and mesh pad systems.

### Additional Subjects Include:

Surface preparation, grinding, polishing, shotpeening & repair of damaged areas; hydrogen embrittlement; cleaning/reverse

etching; principles of chromium plating; post-plate finishing; purifying plating solutions; reversible rack plating; wastewater treatment; analysis of plating solutions; equipment & equipment maintenance; design of scrubbing/ventilation systems.

### Instructor for JAX Course



Frank Altmayer, CEF, AESF's technical director, is president of Scientific Control Laboratories, Inc., Chicago, IL. His company specializes in analytical testing, designing plating plants and consulting on plating problems, wastewater treatment and disposal of hazardous waste. Frank holds a BS in chemical engineering and an MS in metallurgy from the Illinois Institute of Technology. He has served as an AESF instructor for more than 20 years.

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Free Details: Circle 114 on reader service card.

Optional Tour  
Thursday, April 22, 1 p.m.

## Naval Aviation Depot Jacksonville, FL

Tour limited to 100 people.

With a workforce of more than 4,100 civilian employees, the NADEP is the largest tenant command aboard NAS Jacksonville and the largest industrial employer in Northeast Florida and Southeast Georgia.

NADEP personnel perform maintenance on the F-14 Tomcat carrier-based jet fighter, the EA-6B prowler carrier-based electronics countermeasures aircraft, P-3 Orion/EP-3E Aries II antisubmarine patrol aircraft, the F/A-18 Hornet strike fighter, and the T-2 Buckeye basic jet trainer, and emergency rework and modification on S-3 Viking carrier-based electronic countermeasures aircraft, emergency rework and modification of the S-3 Viking carrier-based patrol aircraft, and have retained capability of the A-7 Corsair II light attack jet aircraft for foreign military sales customers. In addition to providing engineering support, Depot teams are sent all over the world to assist ships, squadrons and other units that



The F/A-18 Hornet strike fighter.

require modification, maintenance or repair work.

With the most modern, state-of-the-art engine facility in the Navy, NADEP JAX has complete rework capability for all repairable components, assemblies and accessories. In FY 1997, the Depot processed 28 J52s, 84 F404s, 218 F404 modules, 58 TF34s and 11 TF41s. The engine program comprises four percent of the Depot's workload.

**Premier Engine Depot  
Repair Facility In the World for  
J52s, F404s & TF34s**  
NADEP Jacksonville is the premier J52, F404 and TF34 engine depot repair facility in the world. The Power Plant Complex is currently performing all DoD J52, TF34 and F404 engine repairs, including all en-

gine components and accessories. The state-of-the-art Kemen Engine Cell is capable of testing engines through the entire operating envelope, in both automated and manual modes.

The Cleaning and Plating Facility (86,156 ft<sup>2</sup>) houses all cleaning, plating, plasma spray, coating and other operations required for depot repair.

**Tour Includes:**  
Aircraft Strip Hangar  
Tactical Aircraft Line  
Machine Shop  
Patrol Aircraft Line  
Materials Engineering  
Crinkley Engine Facility  
Cleaning & Plating Facility  
Kemen Engine Test Cell

**Note:** Because of security and liability considerations, tour attendance is limited to 100 people. You must be registered by March 18 to take the tour. Exhibit-only registrants are not eligible for the tour.

Tour attendees **MUST** take the AESF-provided transportation to NADEP. Because NADEP is located on a military base, parking is restricted.

Tickets for this plant tour are \$25. Tickets will not be available on site. If you don't want to miss this tour of an outstanding facility, your registration and payment must be received by March 18.

## ASTM Course on Hydrogen Embrittlement: Process Control & Failure Analysis of Plated or Coated Parts

**April 18 at the Osborn Convention Center**

Dr. Louis Raymond of LRA Labs and Dr. J. Barton Boodey of the RSL™ Technology Center will present a comprehensive short course on methods of controlling a plating or coating process to prevent hydrogen embrittlement of plated or coated parts. These methods include the most advanced accelerated testing techniques that can also be used for failure analysis, including fasteners for aerospace and aircraft applications using the Rising Step Load Method™.

### Course Outline

#### Four sessions:

1. Hydrogen embrittlement standard test methods and their relationship to service life performance
2. Review of the new standard, ASTM F1940, for the verification of process control of hydrogen embrittlement during various plating and coating processes highlighting guidelines on its use
3. The differences between internal hydrogen embrittlement (IHE) from processing and environmentally induced hydrogen embrittlement (EHE)
4. Methods of sorting IHE from EHE in failures.

- The value of the various HE standards is explained: Significance of stress, time, retorquing and loading rates
- Failure analyses of plated parts that focus on hydrogen embrittlement failures as affected by materials, processing, heat treatment, coatings and galvanic coupling are presented.
- Fracture mechanics concepts necessary for the selection of materials, coatings and installation torque for the prevention of in-service stress corrosion and fatigue of fasteners are introduced.

For more information  
or to register, contact:  
LRA Labs, P.O. Box 7925,  
Newport Beach, CA 92658  
phone 949/474-7727;  
FAX 949/474-9807;  
e-mail: LouRaymond@aol.com.

Course fee: \$395 (does not  
include hotel accommodations)

Fundamentals of  
Thermal Spray  
Process (Technology)  
Course #259081499



Tuesday, April 20, 8 a.m.-5 p.m.

Thermal spray coatings continue to receive attention as a method of solving corrosion, wear and compatibility problems. Thermal spray processes of electric arc combustion and plasma spray coatings can apply almost any material to the surface of another. These coating systems must be engineered and applied correctly to operate as an overlay surface. This seminar provides an overview of thermal spray processing science, as well as applications and practice.

Seminar outline: Surface science; equipment & theory; processing & design; materials production for thermal spray processes; selected applications; testing & characterization.

Instructor: Dr. Robert C. Tucker, Jr., FASM. Dr. Tucker is a retired corporation fellow and director, PRAXAIR Surface Technologies, Inc.

Course fee: \$275

To receive a registration form, please call  
ASM International: 1-800/336-5152  
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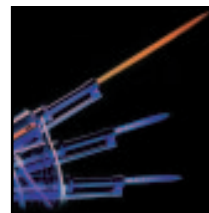
**Plating and Surface Finishing**



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**USFilter**



**TAFE Incorporated**



**METALAST International, Inc.**

## Activity Center—American Electroplaters and Surface Finishers Society (AESF) ..... #401

12644 Research Parkway  
Orlando, FL 32826-3298

Exhibit: The AESF is the sponsor of the Aerospace/Airline Plating & Metal Finishing Forum. Visit the AESF's Activity Center and learn all about the AESF's member services, other major conferences (SUR/FIN® '99—Cincinnati, June 21–24 and AESF Week 2000, which includes the AESF/EPA Conference for Environmental Excellence), courses (including customized, in-house), publications, and monthly journal—*Plating and Surface Finishing*. Managers of jobshops and captive shops are encouraged to list their shop's finishing capabilities in the 1999 *Shop Guide* (FREE listing).

**THIS EXHIBITOR IS AN AESF RESEARCH SPONSOR.**  
FREE Details: Circle 501 on reader service card.

## Automate-Tech Inc. .... #408

4711 126th Ave. N., Suite J  
Clearwater, FL 33762

Exhibit: Automate-Tech Inc. is a manufacturer of turn-key metal finishing equipment for companies starting new ventures and plant expansions. Products include plating lines, programmable hoists and controls, custom filtration systems, corrosion-resistant ventilation and air pollution control, and waste treatment systems, including zero discharge atmospheric evaporators. Our engineered systems will meet the client's specifications, insuring the project's success. Automate-Tech's staff has years of experience and designs metal finishing systems for clients throughout the world. Visit our booth and discuss your requirements with us.

FREE Details: Circle 502 on reader service card.

## BFGoodrich/Corzan Industrial Systems ..... #202

9911 Brecksville Rd.  
Cleveland, OH 44141

Exhibit: BFGoodrich/Corzan Industrial Systems will feature Corzan CPVC pipe and sheet for use in finishing industry installations.

FREE Details: Circle 503 on reader service card.

## Brent America ..... #306

16961 Knott Ave.  
La Mirada, CA 90638-6015

Exhibit: Brent America will feature its chemicals for aircraft maintenance and engine overhaul, as well as testing materials.

FREE Details: Circle 504 on reader service card.

## NEW PRODUCTS EXHIBITED!

### Brooktronics Engineering Corp. ... #509

28231 Ave. Crocker #70  
Valencia, CA 91355

Exhibit: Brooktronics Engineering will have on display examples of brush plating applications for the aerospace industry. This includes BEC 455 Zinc-Tin, which was originally designed as a replacement coating for cadmium. This solution is now under study for use as an on-site repair process for damaged or worn IVD aluminum corrosion protective coatings.

FREE Details: Circle 505 on reader service card.

### Brushtronics Engineering ... Tabletop G

405 Main St.  
Laurel, MD 20707-4115

Exhibit: Brush plating equipment and chemicals will be featured in the Brushtronics Engineering booth.

FREE Details: Circle 506 on reader service card.

## NEW PRODUCTS EXHIBITED!

### CASTion/L&T Technology ..... #212

290 Moody St.  
Ludlow, MA 01056-1244

Exhibit: CASTion/L&T Technology offers turn-key zero-discharge wastewater/chemistry recovery systems based on ultrafiltration, reverse osmosis, ion exchange and proprietary CAST™ (Controlled Atmosphere Separation Technology) flash distillation systems.

FREE Details: Circle 507 on reader service card.

## NEW PRODUCTS EXHIBITED!

### CHEMCO Mfg. Co., Inc. .... #407

3175 MacArthur Blvd.  
Northbrook, IL 60062

Exhibit: CHEMCO will be introducing its newly developed MACH II and MACH III Paint Overspray Collection Systems, specifically designed to bring the aerospace industry into compliance with the EPA's new testing method 319. These "state-of-the-art" systems have gone through exhaustive independent testing to insure strict compliance with the new regulation. In addition, low VOC-strippable paint booth wall coatings and high-strength flame retardant floor coverings, both in current use by the USAF, will be on display.

FREE Details: Circle 508 on reader service card.

## Cleveland Process Corporation .... #402

127 SW 5th Ave.  
Homestead, FL 33030

Exhibit: Cleveland Process Corporation will display immersion heaters and temperature controls.

FREE Details: Circle 509 on reader service card.

## NEW PRODUCTS EXHIBITED!

### CMI International ..... #302

945 Busse Rd.  
Elk Grove Village, IL 60007

Exhibit: CMI International introduces the CMI 700 Series, a new computerized coating thickness measurement system with the capability necessary to measure a wide range of coatings using magnetic induction, eddy current, beta backscatter and microresistance. A large, high-contrast, back-lit display with a menu-based operator interface makes it versatile and easy to use. Measurement data can be exported to an optional CMI database and report program for detailed analysis and graphic presentation of data.

FREE Details: Circle 510 on reader service card.

## NEW PRODUCTS EXHIBITED!

### Columbus Industries Inc. .... #311

2938 St. Rt. 752  
Ashville, OH 43113

Exhibit: Columbus Industries will display several two- and three-stage approved filtration systems to bring aerospace finishing operations into compliance while keeping operating costs in line. An extensive product offering of various filter media allows for configuration of more than 50 possible approved systems to meet the end-user's specific needs. These systems have been independently tested, utilizing U.S. EPA method 319 for compliance with the aerospace MACT standards.

FREE Details: Circle 511 on reader service card.

## NEW PRODUCTS EXHIBITED!

### Cyanide Destruct Systems Inc. .... #405

383 Elmira Rd.  
Guelph, Ontario, Canada

Exhibit: Cyanide Destruct Systems and CDS Environmental Services have two exciting announcements. We have moved! Our new advanced, zero discharge treatment facility accepts bulk solid and liquid loads in addition to drums and precious metals. We are also introducing a new pretreatment system for generators of

rinsewater having difficult-to-treat non-amenable cyanides. This system, integrated with an existing alkaline chlorination system, provides many of the benefits of a traditional CEW Thermal Hydrolysis System at lower cost. CDS is committed to providing cyanide generators with maximum value, service and selection. FREE Details: Circle 512 on reader service card.

**Detrex Corp. .... #410**  
401 Emmett Ave.  
Bowling Green, KY 42101

Exhibit: Detrex Corp. is a major supplier of standard and custom cleaning systems—both aqueous and solvent. Detrex provides equipment, chemistry, waste disposal services and nationwide field service support. For more than 80 years, Detrex has solved cleaning problems. FREE Details: Circle 513 on reader service card.

**NEW PRODUCTS EXHIBITED!**

**Duall Division,  
Met-Pro Corporation ..... #404**  
1550 Industrial Dr.

Owosso, MI 48867

Exhibit: Duall will be featuring its new Oilmaster oil mist eliminator and its new HydroLance wet dust collector. Also featured will be Duall's Beta NO<sub>2</sub> 2000 NO<sub>x</sub> scrubbing system, Hexmaster Chrome Dry Scrubber, corrosion-resistant PVC hoods, ducts, fans, scrubbers and installation services. FREE Details: Circle 514 on reader service card.

**NEW PRODUCTS EXHIBITED!**

**DYNAPOWER CORPORATION .. #309**  
P.O. Box 9210

S. Burlington, VT 05407

Exhibit: DYNAPOWER will exhibit rectifiers and computer control systems designed for metal finishing applications. Included will be the highly efficient Watt-Saver compact rectifier and switchmode power supply line. From 10 kW to 10 MW, the versatility and capabilities of DYNAPOWER's total in-house design and manufacturing services provide both standard and custom configuration options. A complete selection of literature describing the full range of DYNAPOWER products and services will be available. FREE Details: Circle 515 on reader service card.

**Enviro Tech International Inc. .... #203**  
2525 W. LeMoyné

Melrose Park, IL 60160

Exhibit: Enviro Tech International Inc. will feature chemicals, cleaners and solvents. FREE Details: Circle 516 on reader service card.

**Fibergrate Composite  
Structures Inc. .... #307**  
4115 Keller Springs Rd., Suite 224  
Addison, TX 75001

Exhibit: Rigidex™ I and II fiberglass moltruded gratings from Fibergrate Composite Structures Inc. are the first gratings to combine the high performance of fiberglass molded and pultruded grating construction with the low cost of metal grating. Rigidex is corrosion resistant and silicone-free, making it a great flooring or shelving product for the aerospace/airline plating industry. Molded Chemgrate® and Fibergrate® resins are also available, as well as our new Fiberplate® stair-tread covers. FREE Details: Circle 517 on reader service card.

**NEW PRODUCTS EXHIBITED!**

**Finishers' Management ..... #110**  
4350 DiPaolo Center, Suite B  
Glenview, IL 60025

Exhibit: New copies of and subscriptions to *Finishers' Management*, the management publication of the surface finishing industry, will be free to all show attendees. FREE Details: Circle 518 on reader service card.

**Finishers Tech Corp. .... #507**  
319 Main St.

P.O. Box 247

E. Berlin, CT 06023

Exhibit: Finishers Tech will be displaying the latest in automated abrasive blast cleaning and shotpeening equipment. We will also have on hand information about our thermal spray processing equipment, such as abrasive belt grinders for material stripping, thermal spray coating systems and super finishers for final finishing of coatings. On hand will be information on our one-piece flow units that blast-clean turbine blades, and units that automatically blast-clean aircraft stator assemblies. FREE Details: Circle 519 on reader service card.

**Flo King Filter Systems ..... #505**  
1320 Bennett Dr.

Longwood, FL 32750-6341

Exhibit: Flo King in-tank systems pump, filter, agitate and treat without leaks or spills. Ideal for prototype and production plating, anodizing, chromating, iron phosphating and related tanks. A new 12,000-gph system is ideal for large tanks or anywhere aggressive agitation is desired. Systems also available in flow rates of 400, 1200, 3000 and 5000 gph. FREE Details: Circle 520 on reader service card.

**Joint Group on Pollution  
Prevention ..... #104**  
100 CTC Drive

Johnstown, PA 15904

Exhibit: The Joint Group on Pollution Prevention (JG-PP) provides engineering, technical and business services required to identify and accomplish validated pollution prevention projects. JG-PP project findings will be made available to government and industry for future use on pollution prevention opportunities. Current projects include non-chromate conversion coatings, low VOC paint alternatives and cadmium alternatives. FREE Details: Circle 521 on reader service card.

**JPS Technologies ..... #102**  
11110 Deerfield Rd.

Cincinnati, OH 45242

Exhibit: JPS Technologies, Inc. will be showing its manufacturing capabilities, including tanks, hoods, and complete manual and automatic lines. Automated overhead and sidearm systems for retrofit will also be showcased. Supplies for all your plating needs are available at JPS Technologies, Inc.

**THIS EXHIBITOR IS AN AESF RESEARCH SPONSOR.**

FREE Details: Circle 522 on reader service card.

**KCH Services ..... #501**  
P.O. Box 1287

Forest City, NC 28043

Exhibit: KCH Services will feature ventilation and scrubber equipment from Air Management Division and automatic equipment, including the covered tank concept, from Engineered Systems Division. This new division manufactures finishing tank line systems, including programmable hoists and controls.

**THIS EXHIBITOR IS AN AESF RESEARCH SPONSOR.**

FREE Details: Circle 523 on reader service card.

**Kinetico Engineered  
Systems Division ..... Tabletop H**  
10975 Kinsman Rd.

Newbury, OH 44065

Exhibit: Kinetico Engineered Systems Division will feature the continuous ion exchange (CIX) integrated water recycling system for the aerospace plater's wastewater recovery. CIX systems feature a patented high-efficiency countercurrent ion exchange process, using up to 50 percent less chemicals than conventional treatment. Compared to conventional wastewater treatment, the CIX recycles approximately 60–70 percent of an aerospace facility's water, with more than 75 percent reduction in operating costs. FREE Details: Circle 524 on reader service card.

**McGean-Rohco, Inc. .... #411**  
9520 E. Cee-Bee Dr.

Downey, CA 90241

Exhibit: The Cee-Bee Division of McGean-Rohco manufactures maintenance and overhaul chemicals for the commercial and military aircraft industry. Featured products include non-toxic, non-chlorinated, environmentally friendly paint strippers, Super Bee interior/exterior cleaners, and Honey Bee deodorants and cleaners for toilet systems.

**THIS EXHIBITOR IS AN AESF RESEARCH SPONSOR.**

FREE Details: Circle 525 on reader service card.

**NEW PRODUCTS EXHIBITED!**

**Mefiag Division,  
Met-Pro Corporation ..... #406**  
P.O. Box 144

160 Cassell Road

Harleysville, PA 19438

Exhibit: Mefiag's display will feature the V-Series Oil Absorbing Filter that is specifically designed for the removal of oil and grease from cleaning solutions, rinse water, wastewater and other corrosive liquids. The V-Series incorporates a newly designed basket for maximum absorptive capacity and is constructed from all polypropylene materials for superior corrosion resistance. V-Series Filters are available with a full selection of polypropylene pumps and optional slurry tank. Information on Mefiag's high flow horizontal disk filtration systems, all polypropylene systems, in-tank systems, standard out-of-tank systems and filter media will also be available.

FREE Details: Circle 526 on reader service card.

**NEW PRODUCTS EXHIBITED!**

**METALAST International, Inc. .... #511**  
2241 Park Place

Minden, NV 89423

Exhibit: The METALAST anodizing technology includes a superior chemistry, proven research and computerized process controls. In addition, we provide continuing support to our licensees through education, training, industry marketing, referrals and technical assistance. Through our professional staff and programs at the METALAST Tech Center, we offer consistency to the anodizing industry and to the anodizing process itself. METALAST provides manufacturers uniform and replicable results, superior finish characteristics and a network of professional licensees. METALAST: *Tomorrow's Anodizing Today.*

FREE Details: Circle 527 on reader service card.

**Metal Finishing Magazine/  
Elsevier Science Inc. .... #210**  
660 White Plains Rd.

Tarrytown, NY 10591-5153

Exhibit: Stop by our booth and pick up sample copies of our monthly magazine, *Metal Finishing*. Information will be available concerning getting a subscription to *Metal Finishing* and receiving our two directories: *Metal Finishing Guidebook & Directory* and *Metal Finishing Organic Finishing Guidebook & Directory*. Various books covering this marketplace will also be displayed for sale.

**THIS EXHIBITOR IS AN AESF RESEARCH SPONSOR.**

FREE Details: Circle 528 on reader service card.

**NCA Systems, Inc. .... #112**  
2180 Calumet St.

Clearwater, FL 33765

Exhibit: NCA Systems, Inc. will feature an electrically heated electroless nickel module, photo library of aircraft cleaning and plating equipment installations, and custom-fabricated tanks. Polypropylene tank design with standard assembly details. NCA features custom-CAD design and start-to-finish capabilities.

FREE Details: Circle 529 on reader service card.

**PAL Sales, Inc. .... #305**  
145 Flanders Rd.  
Bethlehem, CT 06787  
Exhibit: PAL Sales will feature plating equipment, tape and recovery of process solutions.  
FREE Details: Circle 530 on reader service card.

**Pellu Systems Inc. .... #310**  
1041 Lees Mill Rd.  
Atlanta, GA 30349  
Exhibit: The Pellu Process for wastewater treatment is a highly efficient, cost-effective, integrated process that signifies a major breakthrough in the treatment of heavy-metals-contaminated wastewater. It is effective for all heavy metals, chelated or non-chelated semi-metals (such as arsenic and selenium), as well as some ranges of organics (such as phenols, EDTA and waste solutions high in BODs, CODs and CN). The process directly removes all hexavalent chromium to compliance levels with no intermediate step required for reduction to trivalent chromium. In a typical multi-component metal waste solution, conventional methods require multiple pH adjustments during the treatment process, as well as large holding tanks and clarifiers for the metal flocculation process. The Pellu Process removes all heavy metals from industrial wastewater at just one pH setting.  
FREE Details: Circle 531 on reader service card.

**Petroferm Inc. .... #412**  
5415 First Coast Highway  
Fernandina Beach, FL 32034  
Exhibit: Petroferm's BIOACT® and AXAREL® products are high-performance, environmentally sound cleaning agents for the automotive, aerospace, electronics, optics and general metalworking industries. The

company's new LENIUM™ products provide current users of vapor degreasers with economical drop-in replacements for HCFCs, HFCs and chlorinated solvents. FREE Details: Circle 532 on reader service card.

**PHOTO EMISSION TECH., INC. #308**  
3255 Grande Vista Dr.  
Newbury Park, CA 91320  
Exhibit: PHOTO EMISSION TECH., INC. will be exhibiting surface cleanliness measuring and monitoring systems. These systems detect both organic and/or inorganic contamination, help in optimizing the cleaning process and continuously monitor the process. Come in and evaluate various cleaning processes for effectiveness.  
FREE Details: Circle 533 on reader service card.

**Plating and Surface Finishing (P&SF) ..... #401**  
12644 Research Parkway  
Orlando, FL 32826-3298  
Exhibit: *Plating and Surface Finishing* is the official journal of AESF, the Forum's sponsor. Copies of the March "Aerospace/Airline Forum Show Issue" will be available. *P&SF* keeps its readers informed through a balance of feature and technical articles, information about the AESF and its sister organizations, plus reports of activities in various industry-related arenas—government relations, environmental concerns, safety and regulatory updates, and ongoing research. *P&SF* also publishes the *Shop Guide*, a directory of jobshops and captive finishing shops and their services, cross-referenced by processes, substrates, surface preparation, special processes and organic coatings.  
**THIS EXHIBITOR IS AN AESF RESEARCH SPONSOR.**  
FREE Details: Circle 534 on reader service card.

**Praxair Specialty Products . Tabletop C**  
1555 Main Street  
Indianapolis, IN 46224  
Exhibit: Praxair Specialty Products will highlight new high velocity thermal spray technologies designed for replacement of chrome plating.  
FREE Details: Circle 535 on reader service card.

**Process Technology ..... Tabletop B**  
7010 Lindsay Dr.  
Mentor, OH 44060  
Exhibit: Process Technology, a manufacturer of electric immersion heaters, heat exchangers and temperature controls, will be displaying a number of products. The TherMax<sup>2</sup> in-line heat exchanger is a highly efficient and compact unit with a unique spiral plate design. Heaters include a plug-in option, new fluoropolymer heater sizes, a new lab heater series, new screwplug heaters, and expanded over-the-side metal heater options. We also have a line of helical fluoropolymer heat exchangers and liquid level devices.  
FREE Details: Circle 536 on reader service card.

**Rapid Power Technologies ... Tabletop F**  
18 Old Graysbridge Rd.  
Brookfield, CT 06804  
Exhibit: Rapid Power Technologies offers a complete line of DC power supplies for metal finishing applications that reflect our experience, quality and dedication to your needs. We manufacture state-of-the-art digitally controlled rectifiers, high frequency, fully-sealed switch mode, three-phase SCR power supply, pulsing and reverse pulsing, and a rack-mountable Space Saver SCR with sealed electronics. Our professionals will be available to discuss your custom requirements. A full

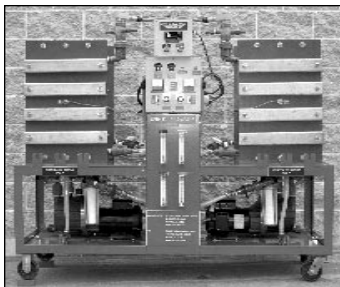
From the makers of:

- Electroless Nickel Dialysis Units
- Acid Recovery Systems
- Closed-loop Rinse Water Systems

Introducing a proven process for the recovery of  
Sulfamate Nickel plating baths...

# SNARE

Sulfamate Nickel Ammonium Removal Equipment



Utilizing hybrid  
Electrodialysis Technology,  
the SNARE has been  
proven to decrease:

- ☞ Chemical Purchases  
by >90%
- ☞ Waste Volume  
by >80%
- ☞ Waste Treatment Costs  
by >90%

When you have Ammonium in your tank,  
it's time to set a SNARE.



165 Front Street, Bldg A/5th Floor, Chicopee, MA 01013  
Telephone: (413) 592-4242 FAX: (413) 592-4004

Free Details: Circle 115 on reader service card.

Free Details: Circle 116 on reader service card.

line of comprehensive literature will be displayed. Stop by and see why Rapid is the leader in the power supply industry.

FREE Details: Circle 537 on reader service card.

**Sanda Corporation..... Tabletop A**  
4005 Gypsy Lane  
Philadelphia, PA 19144

Exhibit: Sanda Corporation will display its new operating program, SandaWin, for the SANDA FACTS™ Titration System. SandaWin is based on the popular Labview platform and allows users to run automated titrations with just one mouse-click. The SandaWin software package has everything you need for full automation of the titration process. Accurate and multiple-task analyses of plating baths will be demonstrated. FREE Details: Circle 538 on reader service card.

**NEW PRODUCTS EXHIBITED!**

**ScrubAir Vent Systems, Inc. .... #204**  
1220 Karl Ct.  
Wauconda, IL 60084

Exhibit: In addition to exhibiting working models of a ScrubAir three-stage composite mesh pad chrome separator and a ScrubAir wet bed scrubber, ScrubAir will also be displaying its chrome separator/hood combination unit. This efficient system saves space, eliminates chrome build-up and leaks into the duct system, and the rinse-down water flows back into the tank. Also new: ScrubAir customized maintenance and service contracts.

FREE Details: Circle 539 on reader service card.

**Sequoia Corp. .... #503**  
4009 Renate Dr.  
Las Vegas, NV 89103

Exhibit: Stop by Sequoia for your free sample of our high-quality plating tapes on display. Our tapes are designed to fit every electroplating need your company may have. We have powder coating tapes, polyester film, fiberglass-aluminum, as well as high-temperature, adhesive, non-adhesive tapes (which are great for hard chrome and electroless nickel), lead and aluminum foil. Our tapes come in different sizes, so there's less waste and greater value for our customers.

FREE Details: Circle 540 on reader service card.

**SERFILCO, Ltd. .... Tabletop D**  
1777 Shermer Road  
Northbrook, IL 60062

Exhibit: SERFILCO will feature filtration equipment for electroplating, anodizing and cleaner solutions as well as for waste-treat polishing. Systems utilize cartridges, discs, bags or permanent filter media. Collection and pumping stations and SER-DUCTOR air-free agitation systems to improve process efficiency will also be presented.

FREE Details: Circle 541 on reader service card.

**NEW PRODUCTS EXHIBITED!**

**Southwest United/Southwest  
Aeroservice Inc. .... #201**  
430 S. St. Louis Ave.  
Tulsa, OK 74120

Exhibit: Southwest Aeroservice, Inc. is an FAA/JAA-approved repair station utilizing thermal spray, welding, machining, grinding and plating services to repair aircraft components. Southwest Aeroservice has developed a process to replace hard chrome plating that does not have a negative impact on health, safety or the environment. The process applies tungsten carbide cobalt (WCCo), using the HVOF thermal spray system. Southwest United Industries, Inc., is a certified metal finishing company specializing in plating, precision grinding, NDT, anodizing and painting services for the aircraft/aerospace and medical industries.

FREE Details: Circle 542 on reader service card.

**NEW PRODUCTS EXHIBITED!**

**TAFA Incorporated ..... #304**  
146 Pembroke Rd.  
Concord, NH 03301

Exhibit: TAFA Incorporated offers engineered aerospace surface technologies and coatings/chromium plat-

ing alternatives. The company is a manufacturer of advanced thermal spray equipment and supplies: HP/HVOF, arc-spray, and handling systems. Wear- and corrosion-resistant, high temperature, abrasives, TBCs and customized applications. No hexavalent chromium coating option.

FREE Details: Circle 543 on reader service card.

**Turco Products ..... #211**  
23610 San Juan Dr.  
Tehachapi, CA 93561

Exhibit: Turco Products will feature environmentally advantaged cleaners and paint strippers.

FREE Details: Circle 544 on reader service card.

**U.S. EPA ETV-MF Program ..... #301**  
c/o Concurrent Technologies  
7990 114th Ave., Suite 2  
Largo, FL 33773

Exhibit: Featured will be EPA's Environmental Technology Verification (ETC) Program for Metal Finishing (MF) Pollution Prevention.

FREE Details: Circle 545 on reader service card.

**USFilter ..... #303**  
28 Cook Street  
Billerica, MA 01821

Exhibit: USFilter is the "one-stop-shop" for all your process water and wastewater needs for the plating industry. USFilter provides services such as dionized water for bath make-up and critical parts rinsing, physical-chemical heavy metals removal, filtration and rinsewater reuse, electrolytic recovery of heavy metals, dewatering and/or disposal of sludge to a RCRA

Part B treatment, storage and disposal site, and acid recovery and purification. Exhibiting on site will be USFilter Recovery Services, Memtek Products and JWI Products.

FREE Details: Circle 546 on reader service card.

**VANAIRE ..... Tabletop E**  
10151 Bunsen Way  
Louisville, KY 40299

Exhibit: VANAIRE is the industry leader in engineering, design and manufacturing, including, but not limited to, wet-packed scrubbers, high-efficiency mist eliminators, fans, ducts and hoods in PVC, CPVC, polypro, solid fiberglass and dual laminates.

FREE Details: Circle 547 on reader service card.

**VeeMetco, Inc. .... #312**  
P.O. Box 329  
Westport, CT 06881-0329

Exhibit: VeeMetco, Inc. will feature anodes for plating.

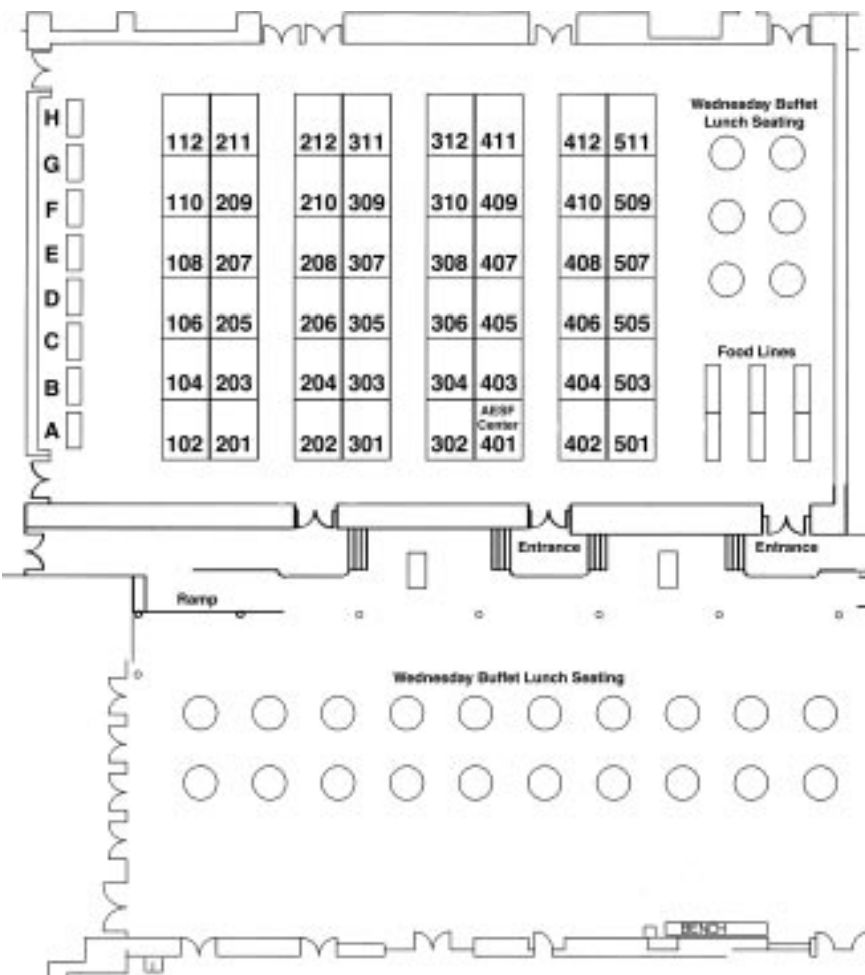
FREE Details: Circle 548 on reader service card.

**F.C. Witt Associates Ltd. .... #403**  
P.O. Box 488  
Claremore, OK 74018-0488

Exhibit: F.C. Witt Associates Ltd. will exhibit flexible membrane liners made from various forms of PVC, PVC/PU, and LFP® Teflon®. Applications include process and storage tanks, waste treatment pits, and all primary and secondary containment tanks and areas. Featured will be a liner for chrome plating with a Teflon® skirt and a liner fabricated from LFP® Teflon®, which can contain any solution up to 450 °F.

FREE Details: Circle 549 on reader service card.

## Exhibit Floorplan



# Product Locator

Meet with Suppliers At the Aerospace/Airline EXPO  
Use this product locator to find products, equipment and services quickly!

## CHEMICALS

### Anodizing Processes

Brooktronics Engineering .....	#509
Brushtronics Engineering .....	G
METALAST International, Inc. ....	#511

### Brightening, Blackening & Antiquing Processes

McGean-Rohco, Inc. ....	#411
Petroform Inc. ....	#412

### Cleaners—Alkaline, Acidic & Emulsion

Brent America .....	#306
McGean-Rohco, Inc. ....	#411
Petroform Inc. ....	#412
Turco Products .....	#211

### Cleaners—Solvents

Brent American .....	#306
Detrex Corp. ....	#410
Enviro Tech International Inc. ....	#203
Petroform Inc. ....	#412
Turco Products .....	#211

### Coatings—Conversion

Finishers Tech Corp. ....	#507
Joint Group on Pollution Prevention .....	#104

### Coating—Thermal Spray

Praxair Specialty Products .....	C
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### Plating Processes

Brooktronics Engineering .....	#509
Brushtronics Engineering .....	G
Joint Group on Pollution Prevention .....	#104

### Strippers

CHEMCO Mfg. Co., Inc. ....	#407
McGean-Rohco, Inc. ....	#411
Turco Products .....	#211

## EQUIPMENT

### Plating & Processing Systems

#### Automated Plating & Processing Systems

Automate-Tech Inc. ....	#408
JPS Technologies .....	#102
KCH Services .....	#501
NCA Systems, Inc. ....	#112
Sanda Corporation .....	A

### Brush Plating Systems & Accessories

Brooktronics Engineering .....	#509
Brushtronics Engineering .....	G

### Hoist Transporters (Automatic & Manual)

JPS Technologies .....	#102
KCH Services .....	#501

### Processing Lines & Tanks

Automate-Tech Inc. ....	#408
Detrex Corp. ....	#410
Sanda Corporation .....	A

### Software—Process Monitoring & Control

METALAST International, Inc. ....	#511
Sanda Corporation .....	A

### Thermal Spray Coating Equipment

TAFI Incorporated .....	#304
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### Plating & Processing Auxiliary Equipment

#### Anodes

VeeMetco, Inc. ....	#312
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### Chillers & Refrigeration Equipment

TAFI Incorporated .....	#304
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### Filters & Filtration Systems

CHEMCO Mfg. Co., Inc. ....	#407
Columbus Industries, Inc. ....	#311
Flo King Filter Systems .....	#505
Kinetico Engineered Systems Div. ....	H
Mefiag Div., Met-Pro Corporation .....	#406
SERFILCO Ltd. ....	D

### Heaters & Heat Transfer Equipment

Cleveland Process Corporation .....	#402
Process Technology .....	B

### Liners

F.C. Witt Associates Ltd., .....	#403
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### Meters, Monitors & Controllers

Cleveland Process Corporation .....	#402
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### Mixing & Agitation Equipment

SERFILCO Ltd. ....	D
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### Power Suppliers

DYNAPOWER CORPORATION .....	#309
Rapid Power Technologies .....	F

### Pumps

Flo King Filter Systems .....	#505
Mefiag Div., Met-Pro Corporation .....	#406
SERFILCO Ltd. ....	D

### Racks

Fibergrate Composite Structures Inc. ....	#307
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### Cleaning Equipment

Detrex Corp. ....	#410
NCA Systems, Inc. ....	#112

### Pollution Control Equipment

#### Air Pollution Control Equipment

CHEMCO Mfg. Co., Inc. ....	#407
Dual Div., Met-Pro Corp. ....	#404
KCH Services .....	#501
ScrubAir Vent Systems, Inc. ....	#204
VANAIRE .....	E

### Water Pollution Control Equipment

Automate-Tech Inc. ....	#408
CASTion/L&T Technology .....	#212
Cyanide Destruct Systems Inc. ....	#405
Dual Div., Met-Pro Corp. ....	#404
Kinetico Engineered Systems Div. ....	H
USFilter .....	#303

### Testing Instruments & Laboratory Equipment

Brent America .....	#306
CMI International .....	#302
Photo Emission Tech. Inc. ....	#308

### Supplies

#### Blasting Equipment & Media

Finishers Tech Corp. ....	#507
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#### Pipes, Fittings, Valves, Floors & Drains

BFGoodrich/Corzan Industrial Sys. ....	#202
Fibergrate Composite Structures Inc. ....	#307

#### Tape

PAL Sales, Inc. ....	#305
Sequoia Corp. ....	#503

#### Waste Treatment/Water Recycling/Recovery/Environmental Services

CASTion/L&T Technology .....	#212
Cyanide Destruct Systems Inc. ....	#405
Kinetico Engineered Systems Div. ....	H
Mefiag Div., Met-Pro Corporation .....	#406
NCA Systems, Inc. ....	#112
PAL Sales, Inc. ....	#305
Pellu Systems Inc. ....	#
USFilter .....	#303

## SERVICES

### Consulting/Engineering/Design Services

Fibergrate Composite Structures Inc. ....	#307
Joint Group on Pollution Prevention .....	#104
JPS Technologies .....	#102
METALAST International, Inc. ....	#511
TAFI Incorporated .....	#304
USFilter .....	#303

### FAA Repair Stations

Southwest United/Southwest Aeroservice Inc. ....	#201
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### Plating Services

Southwest United/Southwest Aeroservice Inc. ....	#201
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### Testing/Analytical Laboratories

CASTion/L&T Technology .....	#212
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### Trade Associations

American Electroplaters & Surface Finishers Society .....	#401
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### Training

American Electroplaters & Surface Finishers Society .....	#401
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### Publications

Plating and Surface Finishing .....	#401
Finisher's Management .....	#110
Metal Finishing Magazine/Elsevier Science Inc. ....	#210

## GOVERNMENT AGENCIES

U.S. EPA Environmental Technology Verification—	
Metal Finishing Program .....	#301





Must be accompanied by payment. Deadline for Advance Registration: March 18, 1999  
AFTER THIS DATE, REGISTER ON-SITE

■ (Choose only one)

- ☐ 20. Chief executive
- ☐ 21. Vice President, other corporate officer
- ☐ 22. Production/plant manager
- ☐ 23. Engineering Director/manager
- ☐ 24. Mfg. process engineer
- ☐ 25. Electrical, electronics engineer
- ☐ 26. Environmental engineer, technician
- ☐ 27. Design engineer
- ☐ 28. All other engineers, technicians
- ☐ 29. Sales, marketing
- ☐ 30. Research manager/director
- ☐ 31. Chemical manager, technical dir./mgr.
- ☐ 32. All other chemists, technicians
- ☐ 33. Quality control/assurance
- ☐ 34. All other managers
- ☐ 35. Foremen, supervisors
- ☐ 36. Plating/Finishing Operators
- ☐ 40. Consultant
- ☐ 98. Retired
- ☐ 99. Other

☐ 01 Jobshop                      ☐ 02 Captive Shop

3. (Choose one)

- ☐ 01 Aerospace      ☐ 06 Printed circuits
- ☐ 02 Appliance      ☐ 07 Other electronics
- ☐ 03 Automotive      ☐ 08 Jewelry
- ☐ 04 Decorative      ☐ 09 Other mfg.
- ☐ 05 Electronics      ☐ 10 Other

- ☐ 01. Electroless
- ☐ 02. Electronics/PWB, including surface mount
- ☐ 04. Environmental control
- ☐ 05. Decorative finishing-automotive, furniture, jewelry
- ☐ 06. Organic finishes-paint, powder
- ☐ 09. Light metals/anodizing
- ☐ 10. Industrial & engineering finishes
- ☐ 11. Brush plating
- ☐ 12. Chemical & physical vapor deposition
- ☐ 15. Electroforming
- ☐ 16. Plating on non-conductors
- ☐ 41. Barrel tumbling/burnishing/vibratory finishing
- ☐ 42. Blasting
- ☐ 43. Conversion coating
- ☐ 45. Electroplating
- ☐ 46. Passivating
- ☐ 47. Phosphating

☐ Enclosed is my check or money order #

in U.S. funds drawn on a U.S. bank, payable to AESF.

- ☐ Charge to my credit card:  
☐ MasterCard ☐ VISA ☐ American Express

Expiration Date: \_\_\_\_ / \_\_\_\_

Account Number

---

Print Name on Card

Signature (name on credit card)

**Note:** Registration will not be processed until payment is received.

## AESF Member Number

**P3**

Name	First	Middle or Initial	Last
Office Telephone (please include your area code)		FAX	
Title		CEF?	
Company			
Company Address (P.O. Box or Street)			
Company Address Continued			
City		State/Country	
Mail/Zip Code		E-mail Address	

90 AESF Member Dues \$90

(price reflects annual dues and \$5 application fee)

\$90

☐ 85 AESF Member Dues renewal \$85

\$85

Advance Registration	
Member	Non-member

<input type="checkbox"/> AERO 99-01	Complete Forum & Exhibit (Apr. 20–22)	\$175	\$200	_____
<input type="checkbox"/> AERO 99-02	Chromium Plating for Engineering Applications (Apr. 20–21)	\$480	\$580	_____
<input type="checkbox"/> AERO 99-03	Tour of Naval Aviation Depot (Apr. 22; advance only; no on-site sale; limited to 100)	\$25	\$25	_____
<input type="checkbox"/> AERO 99-04	Exhibit Only (Apr. 20–21)	-0-	-0-	_____

## Registration Policies

If you cancel a registration more than 15 working days before the start of the educational program, you will receive a full refund. Registrations cancelled thereafter will be subject to a \$50 service charge. Registrants who do not attend and do not notify AESF prior to the program will be charged the entire fee. Telephone and FAX registrations are subject to the same policy. Membership in the AESF is on an individual basis. If you, personally, are not a member, please pay the Non-Member rate. Payment of registration fee conveys right to attend only. No video taping or recording allowed. AESF shall not be liable beyond the refund of the registration fee. No on-site refunds of registration fees will be made. Contact Headquarters in writing for all adjustments. Circumstances may make it necessary to cancel a program or to substitute other qualified speakers. Please consider this when arranging transportation, as AESF cannot assume responsibility for non-refundable tickets. If the program is not held, for any reason, the liability of the AESF is limited to a refund of the registration fee.

TOTAL

- 1. Mail to: AESF**  
12644 Research Parkway  
Orlando, FL 32826-3298



- 2. Call in your registration**  
407/281-6441  
(by credit card)



3. **FAX form to**  
407/281-6446  
(by credit card)

