## Lating Shop Science & Engineering Lab Keep Government Planes Flightworthy

On March 26, the Plating Facility at the San Antonio Air Logistics Center (SA-ALC) at Kelly Air Force Base in San Antonio, Texas, will be the featured tour of the Aerospace/Airline Plating and Metal Finishing Forum. The SA-ALC has one of the largest jet engine overhaul centers in the world, and is in the process of making the transition by the year 2001 from a strictly military to a commercial facility. The 90,000 ft<sup>2</sup> physical plant provides all the plating and metal finishing processes typically needed in an aerospace finishing and rework center. Engines primarily serviced are Pratt & Whitney F-100 jet engines. Tour participants will be guided through the plating shop, the jet engine assembly building, and will even get a brief look at the new state-of-the-art Science and Engineering Lab. Tour highlights are presented here for P&SF readers.

he SA-ALC Plating Facility is located in Building 301 at Kelly Air Force Base in San Antonio. The 90,000 ft<sup>2</sup> physical plant is outfitted with 273 tanks, and processes approximately 25,000 parts per month. While the bulk of the plating facility's support consists of repairs on F100, T56 and TF39 engines, additional support is also provided for rework of accessory, airframe and new manufactured parts. The shop also services other Air Force and Department of Defense equipment as requested.

A multitude of finishing services is provided at the facility. Traditional plating services are hard chromium, electrolytic and electroless nickel, silver and cadmium. A variety of other treatment processes are also offered, such as corrosion treatment for aluminum (sulfuric and chromic acid, hardcoat anodizing and chemical conversion coating) and a proprietary magnesium coating.\* The list doesn't stop there. Other processes include passivation, temper etch, manganese phosphate, black oxide, titanium descaling, solid film lubrication and ion vapor deposition of aluminum.

When parts are received, they are bar-coded in a plating inventory control system (PICS) that provides automated tracking data and specific process information.

## Environmental Zipgrades

Added to Sero-discharge Shop Nancy Stapper, supervisory chemist in the plating facility, said that the



Reassembly is in progress on this F-15 engine.

Plating tolerances are close where aircraft is concerned. The protection of lives and the taxpayers' investment of millions of dollars are at stake. Engine components (shown top left and at right) that have been refurbished to as-good-as-new quality await reassembly in the Jet Engine Division.

original building (occupied in 1978) was designed for recovery and reuse. "It was a zero-discharge facility from day one," she states.



In its recent expansion and upgrading, the Science and Engineering Laboratory at Kelly AFB was outfitted with state-ofthe-art equipment, such as this computerized industrial tomographic analyzer, which is able to scan surfaces in 3-D. Ed Acosta (shown here), the lab's director, reports that the equipment's capabilities are amazing, and that his staff of 85 is continually finding new applications for its use.



<sup>\*</sup>Dow 7 and 19, Dow Chemical Company, Midland, MI



AESF member Nancy Stapper, supervisory chemist in the Weapon Systems Components Plating Shop, is shown during installation of the new 16-stage hard chromium line. The new line features an innovative twist on push-pull ventilation, along with dual mesh, mist-pad eliminators. It is anticipated that 97 percent of the shop's chromium emissions will be eliminated.

> Electroless nickel processing is confined to a room by itself. In the renovation, tanks are now polypropylene, and each is installed with an automated controller. With the adoption of a new solution, waste generation has been reduced from 3,000/gal/month to less than 500 gal/quarter.



You've heard it said that everything is big in Texas, as these deionized water system tanks in the foreground illustrate. The ducting for the new 16-stage hard chromium line can be seen in the background.



The building incorporates chemical containment and rinsewater treatment and recycling. The tanks are positioned on grated flooring so that any spilled liquid can be transported to sumps through troughs in the basement. All rinsewater (except that which contains cyanide) is deionized and recycled through a large, impressive deionization system.

Tanks are ventilated by a push-pull system through ducts to 12 packedbed scrubbers, and the entire tank area is serviced by a monorail hoist system.

The plating facility has recently undergone renovations and environmental upgrades. Electroless nickel processing is confined to a room by itself. Tanks are now polypropylene, and each is installed with an automated controller. Manual lines are hoist-operated. A new solution now used for processing reduces nickel waste. As a result, waste generation has been reduced from 3,000/gal/month to less than 500 gal/quarter.

Because the tanks on the old line had suffered from significant corrosion, the electrolytic nickel line was refurbished to improve efficiency and safety. The existing

hard chrome line (12 3,000-gal tanks) was completely replaced at a cost of \$2.6 million to ensure compliance with NESHAP requirements. The new 16-tank line includes push-pull ventilation, dual mesh, misteliminator pads and HEPA filters. Shop management expects that 97 percent of chromium emissions will be eliminated. Other environ-mental accommodations include:

- Conversion to aqueous degreasers.
- Installation of environmentally compliant degreaser with freeboard.
- Elimination of most cyanidebased strippers and plating solutions.
- The substitution of ion-vapordeposited aluminum for cadmium on T56 engine compressor parts.

The plating facility employs 105 people (journeymen and apprentice platers, inspectors, water treatment operators, chemists and physical science technicians) and operates on three shifts/day. A plating shop laboratory, manned by 10 employees, provides most testing and wet analysis requirements.

## Prefinishing Operations

On the specified OEM maintenance schedule or in cases of failure or problems, jet engines are disassembled and inspected in the Jet Engine Division building. Parts that require repair are routed to the plating shop. Cadmium, chromium, silver and nickel-plated parts are stripped with non-cyanide strippers. Parts are initially cleaned in an aqueous parts washer or a compliant vapor degreaser that uses perchloroethylene.

Blasting with aluminum oxide is often the next step in preparation for finishing. A waste collection system segregates the waste media that is contaminated with chrome or cadmium in separate hoppers, leaving the majority of the waste blast media non-hazardous.



## State-of-the-art Lab Support

An impressive, state-of-the-art science and engineering lab lends its services on request to the plating facility, as well as supports all other industrial shops at Kelly AFB. Built last year, the new 60,000 ft<sup>2</sup> lab employs 85 people who cover five main areas of support: Chemical science, metallurgy, non-destructive testing, reverse engineering/process control and quality verification. All fuels and fluids used in the aircraft serviced at Kelly are tested in this lab.

In addition to well-designed wet chemistry stations, a variety of sophisticated equipment is available to handle any task: Viscosity testers, inductively coupled plasma spectrometers (ICP), a computerized industrial tomographic analyzer (which scans in 3-D) and gas chromatograph, mass and liquid spectrometers-to name a few. High-tech analysis requires high-tech equipment and qualified individuals to operate it and understand the results. Precision is underscored, and constant exchange of information is the objective.

At the SA-ALC, all groups work as a team together—particularly the Plating Facility, the Environmental Group and the Science and Engineer-ing Laboratory—to provide a lot of oversight," says Edward Acosta, laboratory director. "We try to do the best job we can. That's what makes us strong."

In its goal of using materials that are more environmentally friendly, the plating shop has converted to waterborne maskants for use in high-temperature plating baths, such as electroless nickel. Wax is used for low-temperature plating baths.



The objective of the team is to ensure that all government aircraft it supports for the DoD fly safely, as designed. In looking toward possible privatization by the year 2001, the team's philosophy, experience on the job, and expertise provided to DoD support will be extremely valuable to future commercial customers. *PESF* 

Use of IVD equipment has brought environmental benefits with the substitution of ion-vapordeposited aluminum for cadmium on T56 engine compressor parts.

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