



# Plating Team Builds Unique Shop at Boeing Portland

By Neil Cernitz & Bradley C. Johnson

**In a departure from normal procedure, managers at the Boeing Company, one of the world's largest aircraft manufacturers, authorized a hand-picked team of plating shop personnel to work directly with designers and suppliers to construct a new plating facility at Boeing Portland. The result is one of the most efficient and productive shops in the company, which now serves as a model for future improvements at other Boeing plating facilities.**

Boeing's A4582 85-105 processing center at Portland, OR, grew out of the changing work environment within the company. As Boeing moved toward manufacturing business units (MBUs) for each of its product lines, the company determined that the existing processing facility in Portland would no longer meet growing production demands, so it was decided to build a new processing center.

With the stakes being whether or not the needs of the manufacturing business team would be met, and if product could be produced for airplanes that were already sold, Boeing used the design/build project management approach, involving plating shop personnel in planning, designing and building the new center. Manufacturing personnel, who would be the end-users of the facility, usually had little involvement until it was time for the start-up phase.

## Involving Users

Boeing Flap Support Business Team Leader Phil Cavin selected Neil Cernitz and Brad Johnson from the processing shop to work on the project. Cernitz was assigned to oversee the manufacturing requirements in the conceptual, design and construction phases of

the project. Johnson was chosen to help with conveying the shop's needs and requirements, and to assist in ensuring that the facility would produce an end-product to meet Boeing Aircraft Company (BAC) specifications. Cernitz and Johnson, along with other Boeing personnel, worked on the project from start to finish. As a result of their input in the early stages, the original conceptual design, which did not include automation and some of the waste abatement issues that were paramount to the team, was abandoned. The shop was then designed from the ground up with input from the Boeing personnel who would be using it, as well as the vendors chosen to supply the various elements for the project.

Following a thorough bidding process, the new design team selected Haden Management, Auburn Hills, MI, as the prime contractor. The selection marked the first time that a vendor for such a large project was chosen because of its proven track record of providing a quality product on time, instead of being the lowest bidder.

*(above) Shown here in a test flight in April 1995, the 777 is the newest and most modern Boeing aircraft. Boeing Portland's A4582 85-105 processing center finishes a number of parts used in the aircraft.*

## The Processing Shop

Now five years old, the shop that the team provided Boeing consists of a plating and paint department. The plating shop has five fully automated processing lines that are tied together on a network to a mother terminal that acts as an overseer for programming purposes. Each line was designed with safety and waste abatement as the highest priorities. During the design phase, the team painstakingly went tank-by-tank through the proposed set-up to ensure that all of the shop's needs would be met. Although outside firms provided the processing lines, there isn't



*(above) Ron Drysdale loads two 747 Flap Carriages onto the modular Armorclad tooling made by Mitchell-Bate Co. to be processed through the 1945 Ti-Cad line.*

*(left) Boeing employee Rob Winters inputs recipe information into the 1941 aluminum processing line. The semi-automated penetrant inspection system shown in the background is also fed by this line.*



Bill Kennedy, a 25-year veteran of Boeing, uses the automated part numbering system to mark a flap support subassembly for a 777. Boeing Portland employees designed the software for this equipment.

one tank in the shop that was not scrutinized by the Boeing design team.

Each line features a random load scheduler that utilizes reservation-based methodology. Each recipe is based on the BAC specifications that govern the process. The recipes for each part or process are then modified with input from the line operators, depending on rinse, dwell and drying times. The recipes are then signed-off by the shop and quality assurance (QA). The concept of ensuring the quality of the end-product by making sure the parts are being processed to BAC specifications before they enter the line was a major advancement in the way things were done at Boeing Portland. In the past, parts were inspected after they were processed. It is one example of how the shop is working toward achieving reliable methods that will lead to defect-free quality and reduce the need for inspection by outside sources.

Each group of parts processed is traceable by a shop order number. The number and all information attached to the job ticket are kept on magnetic file. This allows shop and QA personnel to pull up information about each load at any given time. Processing personnel can receive information such as time in tanks, temperature of the tanks, voltage and amperage for a particular load and more.

#### Processing Lines

- Line 1941 is primarily used for aluminum, with some ferrous metal capabilities. This line has the ability to complete multiple and variable loads

of parts with a number of processes, including alkaline clean, aqueous clean, clean and etch for penetrant inspection, boric sulfuric acid anodize (with or without seal) and Alodine®.

- Line 1942 is used for passivation of stainless steel and Nital-Etch®.
- Line 1943 is used for chromium plating. This line has three chrome tanks with capabilities of producing hard chrome, thin dense chrome and decorative matte chrome finishes.
- Line 1944 is set up for sulfamate nickel plating, with expansion capabilities for new processing. The shop is currently looking at tin/zinc as a possible replacement for bright cadmium.

- Line 1945 is dedicated to cadmium/titanium alloy plating. It consists of two cadmium/titanium plating tanks with all supporting processing tanks.

The plating shop also has two ovens used for hydrogen-relief baking after plating, a selective plating booth, and off-line masking capabilities.

#### The Paint Department

Boeing Portland's completely automated paint and powder coating shop was also designed with help from com-

pany personnel. It incorporates Boeing designs in almost all aspects, and features the largest class-two oven without doors in the company. Shop capabilities include:

- Epoxy powder coat
- Plastic media blasting
- Ink jet part numbering
- Epoxy coating
- Polyurethane coating
- Masking
- Hand reactivation
- Flash-off oven
- Cure oven

#### Waste Treatment

Shop personnel focused on waste abatement when designing the new shop. The facility is currently using hydroxide precipitation and a polymer for coagulation, and has incorporated cross-flow filtration as a final treatment. The company has found this to be the most efficient treatment without compromising quality.

The waste treatment system is continuously under review. Changes are constantly being made in the program as new technology and better methods become available. Because it is the first facility that plating shop personnel helped design, waste treatment is completed in the same building by shop employees. Wastewater at other Boeing facilities is typically done in an adjacent facility dedicated to waste treatment.

Just one of many plating and surface finishing facilities in the organization, Boeing Portland's A4582 85-105 processing center is one of the most high-tech facilities in the company. The shop employs 36 personnel, and most have completed extensive training in surface finishing, including AESF courses. There are five CEFs on the staff. *P&SF*



(above) In one of Boeing's open-end paint booths, Cindy Miller applies a high-solid top coat to a flap support for a 777.



(right) Mike Morello applies a powder coating to a flight control wheel for a new generation 737.

## About the Authors

*Neil Cernitz has been with the Boeing Company for more than 17 years, starting out as an aircraft spray painter. He has held the position of production painter, paint shop lead, and is currently the manufacturing team leader for the A4580 processing group at Boeing Portland. Prior to Boeing, Cernitz worked for 15 years in various captive electroplating and paint shops at the Naval Air Rework Facility, San Diego, CA.*

*Bradley C. Johnson is an organizational advisor for the A4580 processing group at Boeing Portland, P.O. Box 20487, MS 5P-03, Portland, OR 97220-0487. He has been with Boeing for more than eight years, starting out as a grade-five plater. He has also worked as batteryman, hard chromium plater, plating shop lead and wastewater pretreatment operator. Prior to coming to Boeing, he worked for Technical Finishing and Coatings, Tube Specialties (plating department) and Eastside Plating. Johnson has served as secretary, vice president and two terms as president of the AESF Portland Branch. He currently serves on AESF's Aerospace Plating & Finishing Applications Committee.*

## How Do You Build a Better Shop?

### Ask For Help From Those Who Use It

It's a concept that helped build a better plating and paint shop at Boeing Portland. Management authorized personnel working at the facility to help design and build a surface finishing facility to meet the needs of the company for providing high-quality finishes on airplane parts more efficiently.

"It's the most automated and productive plating shop I have ever visited," says Brad Johnson, organizational advisor for Boeing's A4580 processing group. The facility was designed to process the parts required to build 52 new planes each month. So far, the production capacity has not been challenged, which is one of the unique features of the shop. It allows the processing team to concentrate on providing quality finishes rather than play catch-up. "We never have more than eight hours of work sitting on the floor at any time," Johnson said. "Our sole concern is to produce the highest quality part in a timely manner and in the most economical way possible." Johnson, who grew up in Portland within two miles of Boeing, also says the shop is one of the most environmentally friendly plating facilities in the country, and it is considered the best cadmium/titanium alloy plating facility in the company. "Quality and safety are foremost to us," Johnson concludes. "I grew up here, so this community is special to me, as it is to others who work with me. My wife and I are raising our children here. We are trying very hard to protect the community. We also know how important our job is for building quality aircraft." Allowing surface finishing shop personnel to help design and build the new facility is paying dividends for Boeing and the Portland community.