JSC Metal Finishing Waste Minimization Methods

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JSC Metal Finishing Facility Overview

- Johnson Space Center (JSC) has achieved VPP Star status and is ISO 9001 compliant
- The Structural Engineering Division in the Engineering Directorate is responsible for operating the metal finishing facility at JSC
- The Engineering Directorate is responsible for $71.4 million of space flight hardware design, fabrication and testing

JSC Metal Finishing Facility Overview

- The JSC Metal Finishing Facility processes flight hardware to support the programs in particular schedule and mission critical flight hardware
- The JSC Metal Finishing Facility is operated by Rothe Joint Venture
- The Facility provides following processes
  - Anodizing
  - Alodining
  - Passivation
  - Pickling

JSC Metal Finishing Facility Overview

- JSC Metal Finishing Facility completely rebuilt in 1998
  - Total cost of $366,000.
- All new tanks, electrical, plumbing, and ventilation installed
- Designed to meet modern safety, environmental, and quality requirements
- Designed to minimize contamination and provide the highest quality finishes

Quality In-House Metal Finishing

- In-house metal finishing has significant quality benefits:
  - Better process control
    - Eliminate cross-contamination that causes process variability
    - Metal buildup in process solutions can be verified by JSC laboratories
  - Better process performance
    - Process chemistry can be adjusted to specific requirements for aerospace materials
    - Performance verified through periodic salt spray testing
    - Process improvements can be overseen by engineers firsthand
  - Achieve consistent color and appearance on flight hardware
    - Hardware viewed by millions on international television
  - Immediate troubleshooting
    - Metal finishing process problems can be diagnosed in real time and quickly corrected

Metal Finishing Facility

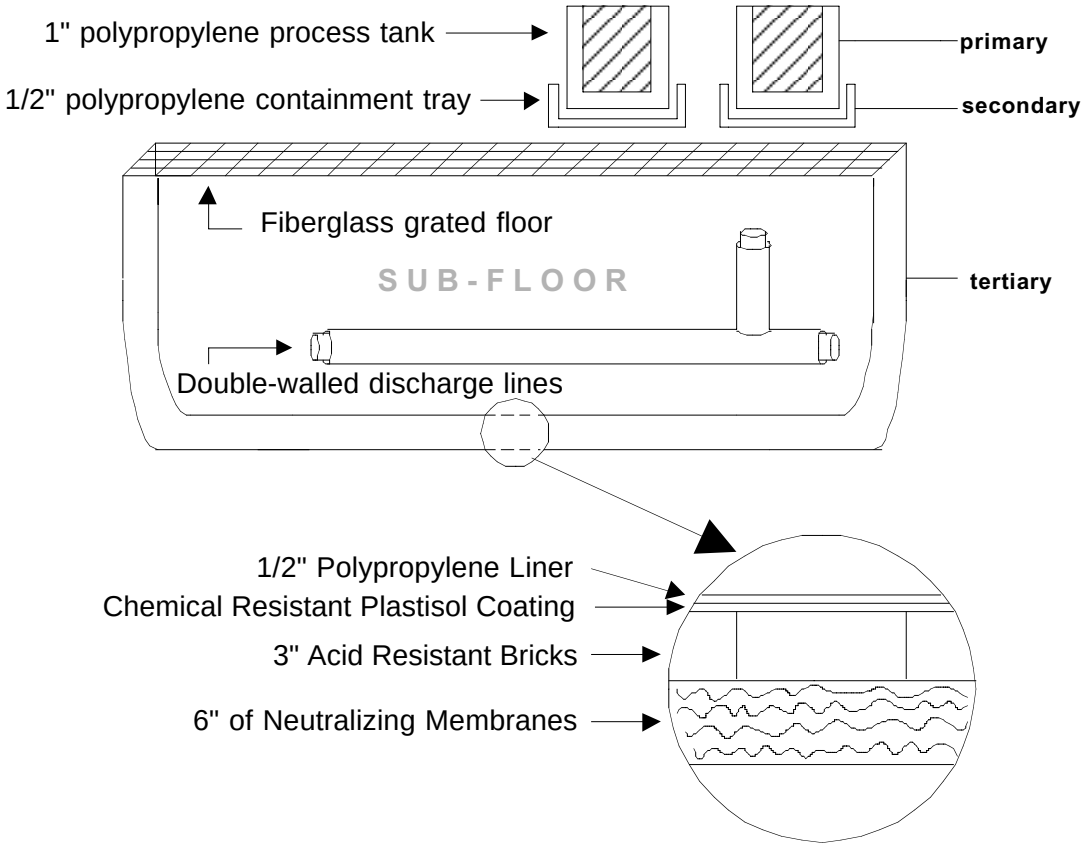
Safety Facility Features

- Process tanks and main floor are completely non-metallic to prevent corrosion
- Sub-floor sealed and seamless polypropylene liner installed that extends 36 inches up the wall
- Open walkways and work areas
- Independent audit by Fuss and O Neil Consulting Engineers found facility met all OSHA safety requirements

Safety Facility Features

- Fumes pulled to back of tank and away from workers
- Hexavalent chromium used only in conversion coating process
  - No agitation or heating of tank
  - Short duration of any potential worker exposure
  - Workers are protected from hexavalent chromium

Safety Multiple Levels of Containment



Environmental Wastewater Minimization

- A dragout rinse tank is used to capture hexavalent chromium from treated parts after conversion coating
  - Resin bed removes chromium from dragout tank
  - Counterflow rinsing is used to minimize volume of rinse water
- Conductivity of rinses are continuous monitored
  - Will detect any contamination before pretreatment

Environmental Compliance

- The JSC Environmental Office oversees the disposal practices of JSC Metal Finishing Facility
- Process chemicals are tanked and trucked to certified disposal facility
- Rinse water is treated and released to sanitary sewer
- Exhaust air is scrubbed and treated
- Zero release of hazardous metals to local environment
- JSC Metal Finishing already meets the *proposed* EPA Metal Products & Machinery (MP&M) Limits for metals in waste water
- The Federal EPA inspected the JSC Facility in 1998
  - EPA refers third parties to JSC for compliance benchmarking

Environmental Past Initiatives

TRANSITION TO NON-CHROMATED PROCESSES	
WAS	**CHANGED TO**
Chromic Deoxidizer	Non-Chromic Deoxidizer
Ferrocyanide Conversion Coatings	Ferrocyanide-Free Conversion Coatings
Chromated Pickles/Strippers	Non-Chromated Pickles
Chromic Acid Anodize	Sulfuric Acid Anodize
Chromated Anodize Seal	Non-Chromated Anodize Seal
Nitric-Chromic Acid Passivation	Nitric Acid Passivation

Memtek Facility

- A pretreatment system is used to treat the rinse waters from the Metal finishing
- The Memtek system is the chemical waste processing system used to reduce chemical waste effluent
  - After treatment, rinse water is clean enough for discharge to sanitary sewer

Memtek Facility

- Utilizes a pH adjustment followed by membrane filtration technology to remove metals prior to discharge to the sewer
- The supernatant sludge is processed through a plate and frame filter creating a dried filter cake.
- Prior to 1998, the filter cake was considered hazardous waste due the concentrations of metals contained in the waste

Environmental Current Initiatives

- **Environmental Initiatives in Progress**
  - **JSC M&P Engineering is working with the Aerospace Chromium Elimination (ACE) industry team in seeking alternatives to hexavalent chromium conversion coatings**
    - ***Non-chromated conversion coatings do not yet match performance of current conversion coatings***
  - **Working towards eliminating the need for a Hazardous Waste Permit for waste collection system**

Summary

- **Metal Finishing Lab is a state-of-the-art facility**
  - **Meets all current and *proposed* safety, environmental and quality requirements**
  - **Allows JSC to develop new replacement technologies**
- **The Metal Finishing Facility provides fast turnaround required for Space Station and Shuttle mission critical flight hardware at JSC**

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