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## Nickel Barrel System

Dear Mike,

In response to your request for a revised Quotation based on our meetings with you and Technic, Inc. is pleased to provide the following Revision

We look forward to working with you and your team on this project. If you have any questions, please do not hesitate to call.

Very truly yours,

**Technic, Inc.**  
**Equipment Division**

**Nickel**  
**Barrel Plating System**

# ***Index***

|                                              |         |
|----------------------------------------------|---------|
| I. Customer Specification and Communications | Page 4  |
| II. Automation Package                       | Page 6  |
| ▶ Hoist Description                          | Page 6  |
| ▶ Hoist Support Steel                        | Page 6  |
| ▶ E-Chain Cable System                       | Page 7  |
| ▶ Hoist Control System Description           | Page 7  |
| III. Tanks and Accessories                   | Page 8  |
| IV. Tanks and Accessories Description        | Page 13 |
| V. Factory Assembly (Modularization)         | Page 13 |
| VI. Exhaust Equipment                        | Page 15 |
| VII. Rectifiers                              | Page 18 |
| VIII. Barrels                                | Page 24 |
| IX. Dryers                                   | Page 24 |
| X. Filters                                   | Page 24 |
| XI. Motor Control Center                     | Page 25 |
| XII. Miscellaneous Equipment                 | Page 26 |
| XIII. Field Installation and Startup         | Page 28 |
| XIV. Items Not Included                      | Page 28 |
| XV. Options                                  | Page 29 |
| XVI. Price Summary                           | Page 29 |
| XVII. Project Schedule                       | Page 30 |
| XVIII. Terms and Conditions                  | Page 31 |
| XIX. Tank Spreadsheets                       | Page 32 |
| XX. Timeway                                  | Page 35 |

## ***I – Proposal based on emails of 5-19-15 and 5-20-15***

|                       |            | <b>Sequence</b> | <b>Nickel Line Layout with times</b>                                                                                             |
|-----------------------|------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------|
| Wax                   | 2minutes   | 20              |                                                                                                                                  |
| Rinse                 | 2 minutes  | 19              |                                                                                                                                  |
| Rinse                 | 1 minute   | 18              |                                                                                                                                  |
| Rinse                 | 1 minute   | 17              |                                                                                                                                  |
| Chromic Acid Dip      | 2 minutes  | 16              |                                                                                                                                  |
| PreSoak Cleaner       | 10 minutes | 1               |                                                                                                                                  |
| SoakCleaner           | 10 minutes | 2               |                                                                                                                                  |
| Rinse                 | 1 minute   | 3               | This tank is not in current line I would like to add                                                                             |
| Electrocleaner        | 10 minutes | 4               |                                                                                                                                  |
| Counter Flow          |            |                 |                                                                                                                                  |
| Rinse                 | 75 seconds | 5               |                                                                                                                                  |
| Counter Flow          |            |                 |                                                                                                                                  |
| Rinse                 | 75 seconds | 6               |                                                                                                                                  |
| Counter Flow          |            |                 |                                                                                                                                  |
| Rinse                 | 75 seconds | 7               | This tank is not in current line I would like to add<br>This is a two station tank but the barrel sits in one station for 8 min. |
| Acid Tank (2 station) |            |                 |                                                                                                                                  |
| Acid Rinse            | 8 minutes  | 8               |                                                                                                                                  |
| Acid Rinse            | 1 minute   | 9               |                                                                                                                                  |
| Counter Flow          | 1 minute   | 10              |                                                                                                                                  |
| Rinse                 |            |                 |                                                                                                                                  |
| Counter Flow          | 3 minutes  | 15              |                                                                                                                                  |
| Rinse                 |            |                 |                                                                                                                                  |
| Counter Flow          | 30 seconds | 14              |                                                                                                                                  |
| Rinse                 |            |                 |                                                                                                                                  |
| Nickel Drag out       | 1 minute   | 13              |                                                                                                                                  |
| Nickel Plating Tank   | 30 seconds | 12              |                                                                                                                                  |
| Nickel Plating Tank   | 6 minutes  | 11              |                                                                                                                                  |
| Nickel Plating Tank   | 6 minutes  | 11              |                                                                                                                                  |
| Nickel Plating Tank   | 6 minutes  | 11              |                                                                                                                                  |
| Nickel Plating Tank   | 6 minutes  | 11              | Total nickel plating time is 54 minutes                                                                                          |
| Nickel Plating Tank   | 6 minutes  | 11              |                                                                                                                                  |
| Nickel Plating Tank   | 6 minutes  | 11              |                                                                                                                                  |
| Nickel Plating Tank   | 6 minutes  | 11              |                                                                                                                                  |
| Nickel Plating Tank   | 6 minutes  | 11              |                                                                                                                                  |
| Nickel Plating Tank   | 6 minutes  | 11              |                                                                                                                                  |

**Proposal Revision 1 based on decision of CLIENT for 18 x 48 barrels and nine (9) stations of Nickel.**

**Revision #2 is based on email dated September 1, 2015 that adds an electro clean tank.**

**Revision #3 is based on the following:**

1. Change plating time. Client requested 57 to 100 minutes. Client will start with 57 minutes and eventually increase the plating time up to 100
2. minutes. Production calculations:
  - a) 2,000,000 parts in eight (8) hours = 250,000 parts per hour.
3. Based on information from Skip in his email of August 17, 2015 3:36 PM
  - b) Present loading and production:
  - c) 120 Lb loads equates to 32,500 parts
  - d) 32,500 parts is about 250 square feet surface area.
  - e) Rectifiers are set at approximately 550 amps per barrel.
4.  $250,000 / 32,500 = 7.69$  loads per hour required.
5. 57 minutes plate / 12 cells = 4.75 min cycle or about 6.5 minutes thus 9.2 barrels per hour.
6. 100 minutes plate / 12 cells = 8.33 min cycle or about 10.0 minutes thus 6.0 barrels per hour.
7. Hoists required to meet production:
  - a) 22 sequences in a cycle.
  - b) With one (1) hoist the cycle time is 10.5 minutes.
  - c) With two (2) hoists the cycle time is 7.5 minutes.
  - d) With three (3) hoists the cycle time is 6.0 minutes.

**Revision #6 is based on meetings with Client**

**All changes to R5 are made in Green Text.**

**All changes to R6 are made in Red Text.**

## ***II – Automation Package***

### **► *Hoist Description***

Three (3) Technic overhead, underhung, inboard hoists designed for ease of service and years of operation. The hoists are constructed of structural steel, welded and shot blasted to assure good adhesion, primed and painted with two part epoxy.

The following features are included in the hoist design:

- Lifting capacity 1500#
- **Leg assemblies fabricated from type 304 stainless steel.**
- Positive rack and pinion horizontal drive.
- Heavy duty servo motor/reducer assemblies.
- Polypropylene belt lift assemblies.
- Station location via servo encoder.
- All set limits for lifting, lowering, anti-collision, end of track shutdown and over-travels are controlled via inductive, solid state proximity switches.
- Bath occupied safety system prevents a load from being lowered into an occupied station.
- Hoist mounted flashing beacon and console mounted safety light tree illuminates to indicate when the hoist is in operation or in the emergency stop mode.
- “RF” hand held unit allows manual control.
- Up barrel rotator assembly.

### **► *Hoist Support Steel***

One (1) floor support structure designed to support hoists and e-chain systems. Approximately 115' ft. long x 13' wide by 12'-6" high. The structure is constructed of structural steel and includes:

- Upright columns with welded base pads.
- Cross-over beams. Adjustment angles.
- Trolley tracks. Drive track with gear rack.
- Diagonal cross bracing.

The individual pieces of the structure are cut, welded where needed, cleaned, primed, and painted with two part epoxy.

## ► ***E-Chain Cable System***

Three (3) e-chain systems complete with cat-track and cable designed to allow hoist movement throughout the length of the line. The system includes entrance glands and terminal junction boxes. Both ends of the cables are marked with individual wire markers for ease of field installation.

## ► ***Hoist Control Center System, (Series***

- At the heart of Technic's automated hoist control systems is an Allen-Bradley programmable controller. The controller, also known as a PLC, is programmed with industry standard ladder logic.
- System includes the PLC, servo drives and all electronic and other components required for operation of the hoists. A lockable main power disconnect, three phase line input fuses, control power transformers, and other associated hardware components are provided.
- Included with the control package are the Allen-Bradley PLC with I/O, I/O Rack, CPU, power supply and a PC based HMI.
- The display will include screens to display hoist status, fault messages, bath temperature, rectifier monitor and control and allow timeway storage and editing of up to 10 timeways.
- One (1) timeway is included. Future timeways can be generated by the end user and entered via the HMI using simple commands.
- If the customer requires Technic Inc. to provide additional timeways these will be completed at \$1,250.00 each.
- Travel motions will be controlled by servo drives.
- The hoist positioning system will be via servo encoder.
- Three modes of operation are provided (fully automated, semi-automated, and manual/jog).
- Hoist control software will consist of one (1) timeway with the PLC operating software.

**Price**

**\$425,000.00**

### ***III - Tanks and Accessories***

## NICKEL LINE

Station #1      Load / Unload      38" x 62" x 55" High

Area includes the following:

- Plastic locating saddles.
- Barrel rotator assembly.
- **Twin** Directional chutes.
- Emergency STOP pull cord switch.
- Emergency STOP push button.

**Station #2      Hoist Adjust      6" DOT**

**This area allows the hoist to adjust for the elevated load/unload stand.**

Station #3 Wax 34" x 62" x 36" Deep

Constructed of 1" thick stress relieved natural polypropylene and includes:

- Welded tubular steel girth band polypropylene encapsulated.
- Water inlet ball valve.
- Plastic locating saddles
- Barrel rotator assembly.

Station #4-6 Triple Counterflow Rinse 100" x 62" x 36" Deep

Constructed of 1" thick stress relieved natural polypropylene and includes:

- Welded tubular steel girth band polypropylene encapsulated.
- 2" side bottom drain outlets to ball valves and Cr. drain.
- 3" full depth overflow weir with outlet to Cr. drain.
- Water inlet ball valves.
- Plastic locating saddles.
- Barrel rotator assemblies.
- **Water solenoid controlled by PLC with adjustable "on time" from the HMI and Dwyer flow meter**

Station #7      Chromic Acid Dip      34" x 62" x 36" Deep

Constructed of 1" thick stress relieved natural polypropylene and includes:

- Welded tubular steel girth band polypropylene encapsulated.
- PVC tank liner.
- Push/Pull exhaust hoods.
- Water inlet ball valve.
- Plastic locating saddles
- Barrel rotator assembly.

Station #8      Pre-Soak Clean      43 x 62" x 36" Deep      160°F  
 Constructed of 1" thick stress relieved natural polypropylene and includes:

- Welded tubular steel girth band polypropylene encapsulated.
- 6" overflow sump.
- 2" side bottom drain outlet to ball valve and Cleaner drain.
- T304 stainless steel electric immersion heaters.
- RTD temperature probe.
- Push/Pull exhaust hoods.
- Water inlet ball valve.
- Plastic locating saddles
- Barrel rotator assembly.
- Pump with skimmer.
- Liquid level safety controller.

Station #9      Soak Clean      43 x 62" x 36" Deep      160°F  
 Constructed of 1" thick stress relieved natural polypropylene and includes:

- Welded tubular steel girth band polypropylene encapsulated.
- 6" overflow sump.
- 2" side bottom drain outlet to ball valve and Cleaner drain.
- T304 stainless steel electric immersion heaters.
- RTD temperature probe.
- Push/Pull exhaust hoods.
- Water inlet ball valve.
- Plastic locating saddles
- Barrel rotator assembly.
- Pump with skimmer.
- Liquid level safety controller.

Station #10      Rinse Future Soak Clean      43 x 62" x 36" Deep      160°F  
 Constructed of 1" thick stress relieved natural polypropylene and includes:

- Welded tubular steel girth band polypropylene encapsulated.
- 6" overflow sump.
- 2" side bottom drain outlet to ball valve and A/A drain.
- Space for T304 stainless steel electric immersion heaters.
- Space for RTD temperature probe.
- Space for Push/Pull exhaust hoods.
- Water inlet ball valve.
- Plastic locating saddles
- Barrel rotator assembly.
- Tank coupling for Pump with skimmer.
- Space for Liquid level safety controller.

Station #11 Electro Clean 40" x 62" x 36" Deep 150°F

Constructed of 1" thick stress relieved natural polypropylene and includes:

- Welded tubular steel girth band polypropylene encapsulated.
- 2" side bottom drain outlet to ball valve and alkaline drain.
- T304 stainless steel electric immersion heaters.
- RTD temperature probe.
- Push/Pull exhaust hoods.
- Water inlet ball valve.
- Cast bronze electrified locating saddles.
- DC buss from both ends for 1000 amps per station.
- Two (2) solid copper anode bars.
- T304 stainless steel anodes
- Barrel rotator assembly.
- Liquid level safety controller.

Station #12 Electro Clean 44" x 62" x 36" Deep 150°F

Constructed of 1" thick stress relieved natural polypropylene and includes:

- Welded tubular steel girth band polypropylene encapsulated.
- 2" side bottom drain outlet to ball valve and alkaline drain.
- Two (2) 12 Kw T304 stainless steel electric immersion heaters.
- RTD temperature probe.
- Push/Pull exhaust hoods.
- Water inlet ball valve.
- Cast bronze electrified locating saddles.
- DC buss from both ends for 1000 amps per station.
- Two (2) solid copper anode bars.
- T304 stainless steel anodes
- Barrel rotator assembly.
- Liquid level safety controller.

Station #13-15 Triple Counterflow Rinse 100" x 62" x 36" Deep

Constructed of 1" thick stress relieved natural polypropylene and includes:

- Welded tubular steel girth band polypropylene encapsulated.
- 2" side bottom drain outlets to ball valves and A/A drain.
- 3" full depth overflow weir with outlet to A/A drain.
- Water inlet ball valves.
- Plastic locating saddles.
- Barrel rotator assemblies.
- **Water solenoid controlled by PLC with adjustable "on time" from the HMI and Dwyer flow meter**

Station #16      Acid      34" x 62" x 36" Deep  
Constructed of 1" thick stress relieved natural polypropylene and includes:

- Welded tubular steel girth band polypropylene encapsulated.
- 2" side bottom drain outlet to ball valve and Acid drain.
- Push/Pull exhaust hoods.
- Water inlet ball valve.
- Barrel rotator assembly.

Station #17-18      Counterflow Rinse      67" x 62" x 36" Deep  
Constructed of 1" thick stress relieved natural polypropylene and includes:

- Welded tubular steel girth band polypropylene encapsulated.
- 2" side bottom drain outlets to ball valves and A/A drain.
- 3" full depth overflow weir with outlet to A/A drain.
- Water inlet ball valves.
- Plastic locating saddles.
- Barrel rotator assemblies.
- **Water solenoid controlled by PLC with adjustable "on time" from the HMI and Dwyer flow meter**

Station #19-21      Triple Counterflow Rinse      100" x 62" x 36" Deep  
Constructed of 1" thick stress relieved natural polypropylene and includes:

- Welded tubular steel girth band polypropylene encapsulated.
- 2" side bottom drain outlets to ball valves and A/A drain.
- 3" full depth overflow weir with outlet to A/A drain.
- Water inlet ball valves.
- Plastic locating saddles.
- Barrel rotator assemblies.
- **Water solenoid controlled by PLC with adjustable "on time" from the HMI and Dwyer flow meter**

Station #22      Drag Out Rinse      30" x 62" x 36"  
Constructed of 1" thick stress relieved natural polypropylene and includes:

- Welded tubular steel girth band polypropylene encapsulated.
- Water inlet ball valve.
- Plastic locating saddles.
- Barrel rotator assembly.
- **Pump with push button (dead man) fill to nickel tank.**

Station #23-28 Nickel Plate 224" x 62" x 36" Deep 140°F  
 Constructed of 1" thick stress relieved natural polypropylene and includes:

- Welded tubular steel girth band polypropylene encapsulated.
- 2" side bottom drain outlet to ball valve and filter.
- Titanium electric immersion heaters.
- Titanium cooling coil with solenoid.
- RTD temperature probe with heating and cooling feature.
- Push/Pull exhaust hoods.
- Water inlet ball valve.
- Cast bronze electrified locating saddles.
- DC buss from both ends for 1000 amps per station.
- Barrel rotator assemblies.
- Twelve (12) solid copper anode bars.
- Eighty four (84) Titanium anode baskets **with bags.**
- Five (5) current shields.
- 6500 GPH filter system.
- Liquid level safety controller.

Station #29-34 Nickel Plate 224" x 62" x 36" Deep 140°F  
 Constructed of 1" thick stress relieved natural polypropylene and includes:

- Welded tubular steel girth band polypropylene encapsulated.
- 2" side bottom drain outlet to ball valve and filter.
- Eight (8) 15 Kw Titanium electric immersion heaters.
- One (1) 15 ft<sup>2</sup> Titanium cooling coil with solenoid.
- RTD temperature probe with heating and cooling feature.
- Push/Pull exhaust hoods.
- Water inlet ball valve.
- Cast bronze electrified locating saddles.
- DC buss from both ends for 1000 amps per station.
- Barrel rotator assemblies.
- Twelve (12) solid copper anode bars.
- Eighty four (84) Titanium anode baskets **with bags.**
- Five (5) current shields.
- 6500 GPH filter system.
- Liquid level safety controller.

**Price**

**\$307,000.00**

## ***IV - Tanks and Accessories Description***

- The tanks supplied will be manufactured by Technic, Inc. Materials will be as listed in the Tank Process sheet. Tank construction will be flat, free of defects, and structurally rigid.
- All polypropylene tanks are constructed using Technic's unique fusion welding hot forming equipment to eliminate vertical tank welded seams. Encased girths are added as required. Tanks are 1" walls x 1" bottoms and 1" rims. Required structural steel girths are welded and encapsulated in a polypropylene shield.
- Saddles mounted on tank rims will be fastened with stainless steel hardware. Saddles are polyglass or polypropylene on non-electrified applications and cast bronzes on electrified applications.
- Tank drain sizes as per Tank Specification sheet.
- Heating element material as per Tank Specification sheet and sized for 4 hour heat up from 65°F (ambient temperature) using 480/3/60
- **Nickel cooling coils will be feed by city water and controlled with solenoids to direct water as required through the cooling coils to feed the rinse tanks.**
- Tanks are 62" wide (front to back) x 36" deep.
- Plumbing on front side.
- Mild steel tank exteriors or angle frame structures are primed and finished with epoxy paint.
- Emergency pull cord system along the operator side.
- **Amp hour controlled nickel brightner feed pumps (1 per nickel tank).**
- Note: External tank plumbing or AC electrical wiring on any of the above is provided in - Factory Assembly Tank Modules.

## ***V - Factory Assembly (Modularization)***

### **A. Tank Module**

Tanks to be mounted on base frame made of structural steel shot blasted primed and painted with acid resistant epoxy paint. (Flexible PVC sheet will be installed between the tanks and epoxy coated steel base frame. PVC will overhang base beam 3" on either side to ensure that drips do not collect on beams and form corrosion cells). The tanks will be bolted to the tank base using type 304 stainless steel hardware to hold the tanks firmly in place. All exterior tank piping connected to headers running to one end of the line including drains, water feeds and push air. All piping will be labeled accordingly with (Seton type) pipe labels.

All electrical wiring for probes on front of tank and solenoid valves completed to junction box on tank line. Conduits and NEMA 4 junction boxes are NEC approved plastics.

Drip shields are supplied over rim barriers on adjacent tanks. Shields are formed for fit and construction of PVC, 16 gauge stainless steel or as required for process.

All piping and electrical piping headers to be supported by stainless steel unistrut stand-offs and clamps.

Tank base frame with piping to be arranged with couplings and tank bases are split to allow breakdown for shipment, and reconnection in convenient lengths of 10-20 feet, or as required.

Drain headers: Acid/Alkaline Rinse, Acid Dump, Cleaner Dump and Chrome Rinse.

Plant water fills.

Push air inlets and header.

Barrel rotator assemblies.

Filters to be hard piped and located behind prospective plating tank.

**Nickel tanks will be plumbed to run separately or together with manual ball valves to create a common solution.**

**Two (2) brightener feed pumps controlled by independent amp hour totalizing feature installed behind the line. Feed tank will be the customers drum of brightener.**

Includes all engineering, material, labor, testing, assembly and disassembly for shipment.

**Price**

**\$243,300.00**

## ***VI - Exhaust Equipment***

### **PVC VENTILATION SYSTEM FOR (7) TANKS @ 32,208 CFM. CFM VOLUME BASED ON PUSH/PULL SYSTEM DESIGNED TO REMOVE APPROXIMATELY 99% OF PARTICULATE TO 6 MICRONS.**

**TECHNIC TYPE MU3 EXHAUST HOODS** to exhaust (7) tanks. Hoods to be 34", 40" and 94" wide X 24" high with (2) slots. Features include drain, drip lip, flexible outlet connection with S.S. draw band and side push shields.

**MATERIAL** - type II, grade I, high impact gray 3/16", 1/4" and 3/8" thick corrosion-resistant PVC.

**PVC DUCTWORK** - Technic custom made PVC ductwork to ventilate (7) tanks.

**MATERIALS** - Ductwork to be fabricated from type II, grade I, high impact, and type I, grade I, normal impact, gray 3/16", 1/4" and 3/8" corrosion-resistant PVC. Accessories include butterfly locking dampers, flanges at equipment connections and couplings at ductwork connections. White PVC shall be provided for duct outside or above the roof.

#### **DUCT PRICES BASED ON THE FOLLOWING:**

1. Estimated roof height above finished floor 20'-0".
2. Approximate centerline of trunkline 12'-0".
3. Fan and scrubber located inside on floor or platform approximately 15'-0" behind the process line.
4. Average tank height of 42" above finished floor.

**TECHNIC FUME SCRUBBER MW-100-35-3-SC cross-current flow @ 32,208 CFM, 2.0" SP.**

**INTERNALS** - 3 feet of Pro-Pak 3.5 corrosion resistant polypropylene packing, Technic chevron mist eliminator, 4" of removable MW-5, high efficiency polypropylene mesh pad mist eliminator, 3/8" thick removable flanged spray headers, Delevan hollow cone spray nozzles.

**MATERIALS** - type II and type I, grade I high and normal impact gray 3/8" thick PVC construction, clear PVC inspection ports, 3/8" thick bolt on pack clean out and fill doors, 3/4" thick inlet and outlet flanges, enamel coated steel channel base with lifting lugs, stainless steel hardware and 100% silicone caulking.

**REMOTE RECIRCULATION SYSTEM – 60" diameter x 46" tall recirculation holding tank** to recirculate 152 GPM with automatic freshwater make-up, constant blow down of approximately 1 GPM, sump box, overflow, drain, 5 HP 230/460/3/60 CPVC vertical pump, gate valves, strainers, LC3 level controller, mechanical float and PVC normally closed solenoid valve.

**ACCESSORIES** – blow down rotameter and magnehelic gauge.

**TRANSITIONS** - inlet and outlet transitions constructed of 3/16" and or 1/4" type II, grade I, white corrosion-resistant PVC with 2" X 3/4" thick mating flange and external reinforcing, silicone caulking, stainless steel bolts, lock washers, flat washers and nuts.

**pH CONTROL SYSTEM** - to include pre-amp, holder, electrode, chemical feed pump and 110/1/60 pH controller mounted inside a NEMA 4x enclosure.

**NOTE:**

1. Chemical feed pump is supplied loose.
2. Controller is mounted to the scrubber.

**REAGENT HOLDING TANK** - carboy of caustic soda to be provided by *MFT/CLIENT/Client*.

**TECHNIC MODEL B.I.** - centrifugal fan no. 49 set up to exhaust **32,208** CFM, @ 6.0" total SP, SWSI, 2456 FPM outlet velocity, 859 RPM, 46.3 BHP, 50 HP, 1750 RPM, TEFC, 230/460/3/60 motor, adjustable motor base, class II, corrosion-resistant coated steel wheel, arrangement 9, CW rotation, UB discharge, totally enclosed OSHA belt and shaft guard, constant speed V-belt drive, heavy duty pillow block bearings, enamel coated steel base, lifting lugs, 3/8" thick bolt-on inspection door, shaft seal, drain, flexible inlet connection and stainless steel hardware.

**MATERIALS** - fan shall be constructed from type II, grade I, high impact white, 3/16", 1/4", 3/8" and 3/4" corrosion-resistant PVC with 2" X 3/4" thick outlet flange. Fan shall be balanced electronically with a vibration analyzer to insure smooth operation.

**VIBRATION ISOLATORS** - housed spring type vibration isolators with non-skid neoprene acoustical pad for static deflection in excess of 1/2".

**STACK AND TRANSITION** – 44"Ø exhaust stack 22'-0" high with fan outlet transition, rain skirt and stack cap with back draft damper.

**MATERIALS** - type II, grade I, high impact gray and white, 3/16" and or 1/4" corrosion-resistant PVC with 2" X 3/4" thick mating flange.

**PUSH DUCT AND HEADERS** – duct and headers shall be schedule 40 and 80 type I, grade I normal impact, corrosion-resistant PVC pipe. Each push header shall include a gate valve or blast gate damper.

**HIGH PRESSURE BLOWER** - model no. HPB-14N6, 502 CFM, 15.8" SP, SWSI, 2510 FPM outlet velocity, 2.1 BHP, arrangement #4 direct drive, CW rotation, BH discharge, flanged outlet and inlet, aluminum wheel, 3 HP, TEFC, 3500 RPM, 230/460/3/60 motor.

**MATERIALS** - fan shall be constructed from 10 gauge steel with 1/4" steel plate pedestal coated with medium gray enamel. Wheel shall be balanced electronically with a vibration analyzer to insure smooth operation.

**MASTER CONTROL PANEL** - built to NEC specifications. Standard features include master on/off switch, on/off switch for each motor, pilot indicator lights for each motor, over load protection, terminal point connections, fused 1 kVA control transformer and NEMA 4 control panel wired for 460/3/60 current with (1) 5 HP pump motor starter, (1) 3 HP push fan motor starter, (1) 50 HP exhaust fan motor starter and 110V power connection for the LC3 and pH.

**INSTALLATION** of the proposed equipment and ductwork to be performed by Technic factory trained non-union personnel or TECHNIC approved sub-contractor. Installation will include setting (1) scrubber, (1) exhaust fan, (1) push fan, (9) hoods, (1) rain skirt, (1) stack, (7) push hoods and erection of all duct.

**NOTE: Wiring from control panel to scrubber and fan system by MFT/CLIENT.**

**HANGERS** - 1-1/2" X 3/16" thick stainless steel flat bar rolled to fit duct diameter. Each hanger shall be of two piece construction and supported with two (2) pieces of 3/8"Ø stainless steel all-thread rods clamped to roof structure with mild steel beam clamps.

**HOOD SUPPORTS** - Exhaust hoods shall be bolted to tank lip and independently supported from the floor, wall or tank.

**PUSH HEADERS** - Push headers shall be mounted with PVC or stainless steel clamps mounted to a 90° bracket fabricated from 1-1/2" X 3/16" stainless steel.

**ROOF MOUNTED EQUIPMENT** - Equipment (scrubbers and fans) shall be set on 4" X 6" treated wood supports set in tar or platform supplied by

**MFT/CLIENT/Client. BY CUSTOMER** - Electrical (materials and labor), roof openings, roof curbs, painting, permits, testing, tear out, steel platforms, staging area for equipment and ductwork (within close proximity of installation site) and 110 volt outlet within 50'-0" of installation.

- 1) **ROOF STRUCTURE** - Responsibility for adequate roof structure to support equipment on roof or ductwork from ceiling shall be by **MFT/CLIENT/Client.**
- 2) **ROOF OPENINGS** - Roof openings by **MFT/CLIENT/Client.**
- 3) **SETTING EQUIPMENT** - Crane cost associated with setting equipment and or ductwork shall be by **Technic.**

**Operating Weight 7,000 Lbs.**

**Price**

**\$178,800.00**

## VII - Rectifiers

One (1) D480 2G12/1000 WRG-TFUSX 480Vac, 3ph, 2 x  $\pm 12$ Vdc/1000A, Air-Cooled, Multi-Output Cabinet w/ Polarity Reversal & 4-20mA Interface

Two (2) D480 6G12/1000 WRG-TFSX 480Vac, 3ph, 6 x 12Vdc/1000A, Air-Cooled, Multi-Output Cabinet w/ 4-20mA Interface

**Price**

**\$111,800.00**

Multi-Output Cabinet is equipped with the MS-Series Family DC switch mode rectifiers and has an integrated polarity change function for each rectifier. The system consists of air-cooled rectifiers in a Nema 12 cabinet.

**Type:**

**D480 2G12/1000 WRG-TFUSX**

This compact DC rectification system is based on modular technology built into sturdy steel cabinet with front door access and removable side panels. Our system offers a unique blend of accessibility, flexibility, safety and reliability.

### Construction:

The Multi-Output cabinet has been specially designed to overcome the accessibility problems of many systems. Simply by opening the steel front door, the operator has access to all the rectifiers, support components and cabling. Accessories are mounted on a separate plate to one side of the cabinet. The AC input will be through a Main Disconnect and DC output is realized from the front of the rectifiers. Combined with the fact that the individual units are fixed to the cabinets frame and the cables are led through cable tray to one side of the cabinet, makes the rectifiers easier to install, remove and/or replaced quickly.

Although working as part of an integrated system, each unit operates independently. Each rectifier is protected by individual circuit breakers, which means each unit can be safely isolated while the others in the system continue operating.

In addition to the thorough attention to design and construction quality, the carefully laid-out cooling system allows the air-cooled power modules inside the cabinets to work extremely reliable with a long lifespan.

A special designed Air Guiding System in the power modules keep the electronic components out of the air flow, which prevents premature failure of the rectifier. Each power module receives fresh cool air through the front of the power and exhausted directly through the back of the cabinet, rather than passed onto the next power module in the system. In combination to the Air Guiding System, an Automatic Fan Speed Control adjusts the air flow to the required cooling and reducing wear of the rectifier cooling fans. With this layout, the cabinet is closed with cooling air entering through air vents located on the cabinet.

#### MS-Series Rectifiers:

The rectifiers themselves are, of course, at the very heart of the system. This Multi-Output cabinet will use our MS-Series Family plug-in modules. It has been especially developed for use in Multi-Output power supplies and is light enough to simply be slid in and out of its place, as required.

The advanced switch mode technology of the MS-Series Rectifier allows for a compact construction and provides a constant low ripple of < 3% over the full output range. The modular plug-in construction allows unparalleled flexibility and user friendliness. Along with the standard protection offered by the cabinet, each rectifier is built into its own powder coated metal enclosure for additional protection.

The rectifier power circuit is designed for continuous operation at the rated output and is especially designed for industrial applications.

#### Polarity Change Function:

The rectifier is featured with a polarity change function via terminals. The output polarity can be changed from + to – and vice versa.

The polarity changer is integrated into the same enclosure as the rectifier.

To reduce the wear of the contactor(s), the polarity changer is supervised by an internal PLC, which ensures that the polarity change is conducted under load-free condition. By using this method the operator can change the polarity during operation without causing any arcing at the contactor.

#### Main Components:

- Main disconnect
- Power distribution within the cabinet
- Separate circuit breakers for each rectifier
- Separate rectifier modules in a compact plug-in technology
- EMC filter
- Power semiconductors for pulse amplitude modulation
- Electronics for constant current and voltage control
- Polarity changing contactors

#### Protection Devices:

- Main disconnect for the whole cabinet
- Separate circuit breakers for each rectifier
- Over temperature monitoring for each rectifier
- Over current protection
- Short-circuit protection

#### Controls:

- Set-Point Adjustment for V + A: 4-20mA
- Actual Feedback Values for V + A: 4-20mA
- Rectifier “On/Off” (Customer)
- Fault Feedback N.O. & N.C. (Customer)
- Anodic/Cathodic switchover (Customer)

#### Special Feature (X):

- 4-20mA Interface (APP1007)
- Polarity Reversal per Rectifier Output

#### Technical Data:

|                          |                                  |
|--------------------------|----------------------------------|
| <b>Mains voltage:</b>    | <b>480V, 3Ph, 50/60 Hz + GND</b> |
| <b>Input current:</b>    | <b>36 A</b>                      |
| <b>Mains power:</b>      | <b>29.9 kVA</b>                  |
| <b>Power factor:</b>     | <b>&gt; 0.94</b>                 |
| <b>Rated DC voltage:</b> | <b>2 x +/-12 V</b>               |
| <b>Rated DC current:</b> | <b>2 x +/-1000 A</b>             |
| <b>Duty factor:</b>      | <b>100 %</b>                     |

|                      |                                |
|----------------------|--------------------------------|
| Ripple:              | < 3 % across full range of     |
| control              |                                |
| Adjustment:          | 1 - 100 %                      |
| Control:             | constant current and voltage   |
| control              |                                |
| Control accuracy:    | < 1 %                          |
| Cooling:             | Forced air-cooled              |
| Ambient temperature: | Up to 95 °F                    |
| Site altitude:       | Up to 3280 ft. above sea-level |
| Dimensions:          | 24/ 32/ 79 (W/ D/ H) inches    |
|                      | (+ 4 inch base)                |

### Description:

Our Multi-Output Cabinet is equipped with our advanced switch mode MS-Series Family DC rectifiers. The system consists of air-cooled rectifiers in a Nema 12 cabinet.



This compact DC rectification system is based on modular technology built into sturdy steel cabinet with front door access and removable side panels. Our system offers a unique blend of accessibility, flexibility, safety and reliability.

### Construction:

The Multi-Output Cabinet has been specially designed to overcome the accessibility problems of many systems. Simply by opening the steel front door, the operator has access to all the rectifiers, support components and cabling. Accessories are mounted on a separate plate to one side of the cabinet. The AC input will be through a Main Disconnect and DC output is realized from the front of the rectifiers.

Combined with the fact that the individual units are fixed to the cabinets frame and the cables are led through cable tray to one side of the cabinet, makes the rectifiers easier to install, remove and/or replaced quickly.

Although working as part of an integrated system, each rectifier operates independently. Each rectifier is protected by individual circuit breakers, which means each rectifier can be safely isolated while the others in the system continue operating.

In addition to the thorough attention to design and construction quality, the carefully laid-out cooling system allows the air-cooled power modules inside the cabinets to work extremely reliable with a long lifespan. A special designed Air Guiding System in the power modules keep the electronic components out of the air flow, which prevents premature failure of the rectifier. Each power module receives fresh cool air through the front of the power and exhausted directly through the back of the cabinet, rather than passed onto the next power module in the system. In combination to the Air Guiding System, an Automatic Fan Speed Control adjusts the air flow to the required cooling and reducing wear of the rectifier cooling fans. With this layout, the cabinet is closed with cooling air entering through air vents located on the cabinet.

#### MS-Series Family Rectifiers:

The rectifiers themselves are, of course, at the very heart of the system. This Multi-Output cabinet will use our MS-Series Family plug-in modules. It has been especially developed for use in Multi-Output power supplies and is light enough to simply be slid in and out of its place, as required.

The advanced switch mode technology of the MS-Series Rectifier allows for a compact construction and provides a constant low ripple of < 3% over the full output range. The modular plug-in construction allows unparalleled flexibility and user friendliness. Along with the standard protection offered by the cabinet, each rectifier is built into its own powder coated metal enclosure for additional protection.

The rectifier's power circuit is designed for continuous operation at the rated output and is especially designed for industrial applications.

#### Main Components:

- Main power in
- Power distribution within the cabinet
- Separate circuit breakers for each rectifier
- Separate rectifier modules in a compact plug-in technology
- EMC filter
- Power semiconductors for pulse amplitude modulation
- Electronics for constant current and voltage control

#### Protection Devices:

- Main disconnect for the whole cabinet
- Separate circuit breakers for each rectifier
- Temperature monitoring for each rectifier
- Over current protection
- Short-circuit protection
- Over temperature supervision for each module

#### Controls:

- Set-Point Adjustment for V + A: 4-20mA
- Actual Feedback Values for V + A: 4-20mA
- Main Input Contactor "On/Off" (Customer)
- Pulse Enable "On/Off" (Customer)
- Fault Feedback (Customer)

#### Special Feature (X):

- 4-20mA Interface (APP1007)

#### Technical Data:

|                    |                            |
|--------------------|----------------------------|
| Mains voltage:     | 480V, 3Ph, 50-60Hz + GND   |
| Input current:     | 105 A                      |
| Mains power:       | 87.3 kVA                   |
| Power factor:      | > 0.94                     |
| DC output voltage: | 6 x 12 V                   |
| DC output current: | 6 x 1000 A                 |
| Duty factor:       | 100 %                      |
| Ripple:<br>control | < 3 % across full range of |

|                             |                                       |
|-----------------------------|---------------------------------------|
| <b>Adjustment:</b>          | <b>1 - 100 %</b>                      |
| <b>Control:</b>             | <b>constant current and voltage</b>   |
| <b>control</b>              |                                       |
| <b>Control accuracy:</b>    | <b>&lt; 1 %</b>                       |
| <b>Cooling:</b>             | <b>air-cooled</b>                     |
| <b>Ambient temperature:</b> | <b>up to 95 °F</b>                    |
| <b>Site altitude:</b>       | <b>up to 3280 ft. above sea level</b> |
| <b>Cabinet Dimensions:</b>  | <b>39/ 32/ 79 (W/ D/ H) inches</b>    |
|                             | <b>(+4" inches base)</b>              |

## ***VIII - Barrels***

Based on a 57 minute plating time eighteen (18) barrels will be necessary.

Eighteen (18) 18 x 48 heavy duty plating barrel assemblies , includes round cylinders , ½" thick textured sidewall , 1" thick drop in style covers [2] with snap locks , polypro hangers, dangler contacts , plastisol coated superstructure with auto pickups , shipped complete and ready for online operation [superbarrel configuration.

|              |                     |
|--------------|---------------------|
| <b>Price</b> | <b>\$105,500.00</b> |
|--------------|---------------------|

## ***IX – Spin Dryers***

Two (2) DESCO 2318 spin dryers with **12 Kw electric heater, timer located inside control panel. audible adjustable horn and strobe light.** Includes four (4) **polypropylene** baskets.

|              |                    |
|--------------|--------------------|
| <b>Price</b> | <b>\$41,000.00</b> |
|--------------|--------------------|

## ***X – Filters***

Two (2) 6500 GPM Disc Filter Systems.

|              |                    |
|--------------|--------------------|
| <b>Price</b> | <b>\$36,400.00</b> |
|--------------|--------------------|

## ***XI – Motor Control Center***

Stand-alone Nema 12 enclosures with flanged mounted disconnects with motor starters, fuse protection and HMI interface for the following devices:

- ▶ Filters
- ▶ Pumps
- ▶ Barrel rotator motors. Programmable for rotation when occupied only.

**Price**

**\$79,500.00**

## ***XII – Miscellaneous Equipment***

***None***

## ***XIII - Field Installation and Start Up***

**CLIENT will be responsible for the following:**

1. Staging area for unloaded equipment.
2. Floor curbing and floor preparation (coating).
3. Plumbing facility connection points no more than 20 feet from line.
4. **Electrical connections for the following:**
  - ▶ 480 volt AC to remote control enclosures and terminating at disconnect input terminals.
  - ▶ 480 volt AC to rectifiers, blowers and fans and filters and terminating at disconnect input terminals.
  - ▶ 110 volt AC to operator interface enclosure and terminating at disconnect input terminals.
  - ▶ Conduit and wiring from the operator enclosure to the hoist control enclosure. Includes terminations at each end.
  - ▶ Conduit and wiring from three (3) e-chain terminal junction boxes to the hoist control enclosure. Includes terminations at each end.
  - ▶ Conduit and wiring from tank line terminal junction box to the motor control enclosure and interconnecting between hoist control enclosure. Includes terminations at each end.
  - ▶ Conduit and wiring from fourteen (14) rectifiers to the hoists control enclosure for 4-20 ma communication. Includes terminations at each end.
  - ▶ Conduit and wiring from the loading/unloading area to the hoist control enclosure includes cart in position sensor, cart occupied sensor and hoist interlocking safety yoke switches. Includes terminations at each end.
  - ▶ Conduit and wiring from exhaust control panel to the exhaust components.
  - ▶ Technic will provide electrical installation drawings allowing
  - ▶ CLIENT to use local electrical contractors to bid.

**Technic, Inc. will complete the following:**

1. Unloading of trucks and stage in a clear area provided by customer.
2. Normal rigging to location.
3. Erect hoist support structure.
4. Install tank line
5. Reconnect plumbing and electrical at line splices.
6. Install e-chain systems.
7. Install hoists.
8. Set control enclosures.
9. Install rectifiers and buss with copper **cables**.
10. Install load / unload area.
11. Install Filters and hard plumb.
12. Install spin dryers.
13. Install hoods and ductwork.
14. Install exhaust fan and scrubber.
15. Install push air system.
16. Plumb to facility connections.
17. Plumb cooling water within 20 linear feet for connection points.
18. Plumb exhaust system.
19. Install drip shields.
20. Mount hoist interlocking safeties at load / unload area.
21. Test line plumbing and electrical.
22. Train CLIENT personnel on the new system.

**Price**

**\$210,000.00**

## ***XIV - Items Not Included in this Proposal***

1. Necessary removal or relocation of existing equipment or utilities.  
Lighting or relocation of existing lighting.
2. Facility or modifications to building or roof.
3. Concrete work, piers, sumps or floor coatings.
4. Room make-up air for exhaust systems.
5. AC power distribution panel, bus-duct branches, and step down transformers.
6. Chemicals.
7. Anodes.
8. Freight to customer facility.
9. Environmental or construction permits.
10. Fees, licenses, taxes of any kind.
11. OSHA energy lockout devices.
12. Back flow preventers for main header lines.
13. Field electrical contactors or disconnect switches.
14. Electrical Installation.
15. Waste water chemical treatment units.
16. Chiller.
17. Items not specifically offered in this proposal.

## ***XV – Options***

**None**

## ***XVI - Price Summary***

|                                  |              |
|----------------------------------|--------------|
| AUTOMATION PACKAGE               | \$425,000.00 |
| TANKS AND ACCESSORIES            | \$307,000.00 |
| FACTORY ASSEMBLY                 | \$243,300.00 |
| EXHAUST EQUIPMENT                | \$178,800.00 |
| RECTIFIERS                       | \$111,800.00 |
| BARRELS                          | \$105,500.00 |
| DRYERS                           | \$41,000.00  |
| FILTERS                          | \$36,400.00  |
| MOTOR CONTROL CENTER             | \$79,500.00  |
| INSTALLATION, STARTUP & TRAINING | \$210,000.00 |

|                    |                       |
|--------------------|-----------------------|
| TOTAL SYSTEM PRICE | <b>\$1,738,300.00</b> |
|--------------------|-----------------------|

## ***Options not included in Price Summary***

## ***XVII - Project Schedule***

Shipment of Equipment: 24 - 26 weeks after drawing approval.

FOB Destination, Prepaid & Add

TERMS: 10 % down payment due with purchase order.  
 40 % due upon approval of engineering drawings.  
 40 % due upon inspection prior to shipment.

Progressive payments to 90% of total contract due before shipment.

10 % due after delivery and upon installation, testing, training and acceptance of equipment by CLIENT. If CLIENT elects to postpone delivery or installation for more than 60 days after the agreed upon dates, then Seller may invoice CLIENT for the balance.

*Note: Factory major equipment assemblies are normally scheduled on commercial carrier exclusive air-ride vans to ensure safe, prompt shipment. Customer to specify other arrangements if required.*

## ***XVIII - Terms and Conditions***

### **A. OSHA**

Seller is using its best efforts to comply with those OSHA rules and regulations that are in effect at the time of this quotation. If, any time prior to start-up of the equipment, it is found that the equipment does not comply with the OSHA rules and regulations, whether because of issuance of new rules and regulations or modification of existing rules and regulations, seller will, at the customer's request, negotiate the costs for updating the equipment to comply with such rules and regulations. Furthermore, since these regulations are subject to interpretation of the local OSHA inspection, some minor additions may be required at the time of installation. The costs incurred because of any additions will also be negotiated.

### **B. WARRANTY**

Seller agrees, at its discretion, to repair, replace or provide a refund for any item of equipment proved to be defective in material or workmanship, under normal use and operational conditions, for a period of 12 months from the date of delivery. If the equipment operates more than eight hours per day, each eight hour shift shall be equivalent to one day, and non-use shall in no way increase the 12 month limit. Seller may require Buyer to return any defective parts or material to Seller's plant at the expense of Buyer for inspection. The above remedies shall be exclusive of any other remedies the Buyer might have, and no claim of any kind shall be greater in amount than the purchase price of the item of equipment found to be defective. Any item not manufactured by Seller is subject to the Warranty issued or considered standard practice by the manufacturer thereof, and the item is warranted by Seller only in accordance therewith. Seller shall have no liability for any loss of, or delay in production, or for any incidental or consequential damages. Seller assumes no responsibility for any delay in fabrication, assembly, delivery or installation of the equipment caused by strikes, acts of God, civil commotion, war, Government regulation, unavailability of materials or services, any act of omission of Buyer or other condition beyond control of Seller, and Seller shall have no liability for damages or loss caused thereby.

### **C. Field Service**

The Seller will provide field service on request at any time during the life of the equipment. The Buyer is responsible for the cost of labor and travel expenses for the visit for both warranty and non-warranty items.

### **D. Price**

The price quoted is firm for 30 days from this date, except as otherwise stated and thereafter will be subject to change anytime prior to acceptance of Buyer's purchase order by Seller.

### **E. Cancellation**

An order may be canceled only with the written consent of the Seller, and upon terms that will protect the Seller against loss on all costs incurred and will further provide a fair profit on the work performed on such order.

### **F. Changes**

A change in the specifications, related to the equipment or in shipping instructions or specified delivery date, may be made only with the approval of the Seller. If a change made at the request of the Buyer increases the Seller's cost, such increase may be added to the purchaser's price at the election of Seller.

### **G. General**

The undertakings of the Seller herein are limited to the Buyer and are not assignable by Buyer and, shall terminate upon sale or other transfer of the equipment by Buyer. If any provision of Buyer's purchase order is inconsistent with a provision of this proposal, the provision of this proposal shall control. Seller is willing to sign a non-disclosure agreement.

### **H. Taxes and Permits**

Taxes, license fees, environmental or construction permits are the responsibility of the buyer.

### **I. Freight**

Freight is quoted FOB Origin unless explicitly stated otherwise. If a price for freight is listed in the quote, it is for budgetary purposes only. The actual freight cost will be passed on to Buyer.

# Exhibit B

[illegible]

[illegible]

| Process | Tank | Station |                                    | Temp.   | Time            | No. of   | Tank | Tank Size | Capacity | Tank     | Overflow | Bottom | Rinse   | City  | Drain   |
|---------|------|---------|------------------------------------|---------|-----------------|----------|------|-----------|----------|----------|----------|--------|---------|-------|---------|
| Steps   | No.  | No.     | Process                            | °F      | (min.)          | Stations | DOT  | w" x d"   | (gals.)  | Lining   | Weir     | Drain  | Control | Water | Header  |
| 1-23    |      | 1       | Load/Unload                        |         | Max             | 1        | 38   | 62" x 60" |          | 304 SS   |          |        |         |       |         |
|         |      | 2       | Hoist Adjust                       |         |                 |          | 6"   |           |          |          |          |        |         |       |         |
| 22      | 1    | 3       | Wax                                |         | 2               | 1        | 34   | 62" x 36" | 301      | Poly     |          |        |         | Yes   |         |
| 19-21   | 2    | 4-6     | Triple Counterflow Rinse           |         | 1-2 per station | 3        | 100  | 62" x 36" | 886      | Poly     | 3"       | 2"     | Yes     | Yes   | Cr.     |
| 18      | 3    | 7       | Chromic Acid Dip                   |         | 2               | 1        | 34   | 62" x 36" | 301      | PVC/Poly |          |        |         | Yes   |         |
| 2       | 4    | 8       | Pre-Soak Clean                     | 160     | 5-6             | 1        | 43   | 62" x 36" | 381      | Poly     | 6"       | 2"     |         | Yes   | Cleaner |
| 3       | 5    | 9       | Soak Clean                         | 160     | 5-6             | 1        | 43   | 62" x 36" | 381      | Poly     | 6"       | 2"     |         | Yes   | Cleaner |
| 4       | 6    | 10      | Rinse / Cleaner                    | Future  | 1-2             | 1        | 43   | 62" x 36" | 381      | Poly     | 6"       | 2"     | Yes     | Yes   | A/A     |
| 5       | 7    | 11      | Electro Clean PR                   | 150     | 5-6             | 1        | 40   | 62" x 36" | 354      | Poly     |          | 2"     |         | Yes   | Cleaner |
| 6       | 8    | 12      | Electro Clean PR                   | 150     | 5-6             | 1        | 40   | 62" x 36" | 354      | Poly     |          | 2"     |         | Yes   | Cleaner |
| 7-9     | 9    | 13-15   | Triple Counterflow Rinse           |         | 1-2 per station | 3        | 100  | 62" x 36" | 886      | Poly     | 3"       | 2"     | Yes     | Yes   | A/A     |
| 10      | 10   | 16      | Acid                               | Ambient | 2-3             | 1        | 34   | 62" x 36" | 301      | Poly     |          | 2"     |         | Yes   | Acid    |
| 11-12   | 11   | 17-18   | Counterflow Rinse                  |         | 2-3 per station | 2        | 67   | 62" x 36" | 593      | Poly     | 3"       | 2"     | Yes     | Yes   | A/A     |
| 15-17   | 12   | 19-21   | Triple Counterflow                 |         | 1-2 per station | 3        | 100  | 62" x 36" | 886      | Poly     | 3"       | 2"     | Yes     | Yes   | A/A     |
| 14      | 13   | 22      | Drag Out Rinse                     |         | 1-2             | 1        | 30   | 62" x 36" | 266      | Poly     |          |        |         | Yes   |         |
| 13      | 14   | 23-28   | Nickel Plate                       | 140     | 57-60           | 6        | 224  | 62" x 36" | 1984     | Poly     |          |        |         | Yes   |         |
| 13      | 15   | 29-34   | Nickel Plate                       | 140     | 57-60           | 6        | 224  | 62" x 36" | 1984     | Poly     |          |        |         | Yes   |         |
|         |      | 35      | Anode Service                      |         |                 |          | 12"  | 62" x 36" |          | Poly     |          | 2"     |         | Yes   | A/A     |
|         |      |         | Off Line                           |         |                 |          |      |           |          |          |          |        |         |       |         |
|         |      |         | (4) Spin Dryers                    |         |                 |          |      |           |          |          |          |        |         |       |         |
|         |      |         | Loading System                     |         |                 |          |      |           |          |          |          |        |         |       |         |
|         |      |         | Material Handling System by Client |         |                 |          |      |           |          |          |          |        |         |       |         |

| Station |                             | Heat     | Cooling  | Temp.   | Level  | Rectifier      | Anode | Anodes or | Anode | Push/Pull | Filter | Recirc  | PH      | Tank   | Brightner | Other      |
|---------|-----------------------------|----------|----------|---------|--------|----------------|-------|-----------|-------|-----------|--------|---------|---------|--------|-----------|------------|
| No.     | Process                     | Coil     | Coil     | Control | Safety | Qty/Amps/Volts | Bars  | Baskets   | Bags  | Exhaust   | GPH    | Pump    | Monitor | Covers | Pump      |            |
| 1       | Load/Unload                 |          |          |         |        |                |       |           |       |           |        |         |         |        |           |            |
| 2       | Hoist Adjust                |          |          |         |        |                |       |           |       |           |        |         |         |        |           |            |
| 3       | Wax                         |          |          |         |        |                |       |           |       |           |        |         |         |        |           |            |
| 4-6     | Triple Counterflow Rinse    |          |          |         |        |                |       |           |       |           |        |         |         |        |           |            |
| 7       | Chromic Acid Dip            |          |          |         |        |                |       |           |       | Yes       |        |         | Yes     |        |           |            |
| 8       | Pre-Soak Clean              | 304 SS   |          | RTD     | Yes    |                |       |           |       | Yes       |        | Skimmer |         |        |           |            |
| 9       | Soak Clean                  | 304 SS   |          | RTD     | Yes    |                |       |           |       | Yes       |        | Skimmer |         |        |           |            |
| 10      | Rinse / Cleaner             | Future   |          | Future  | Future |                |       |           |       |           |        | Future  |         |        |           |            |
| 11      | Electro Clean PR            | 304 SS   |          | RTD     | Yes    | 1/1000/12 PR   | Cu.   | 304 SS    |       | Yes       |        |         |         |        |           |            |
| 12      | Electro Clean PR            | 304 SS   |          | RTD     | Yes    | 1/1000/12 PR   | Cu.   | 304 SS    |       | Yes       |        |         |         |        |           |            |
| 13-15   | Triple Counterflow Rinse    |          |          |         |        |                |       |           |       |           |        |         |         |        |           |            |
| 16      | Acid                        |          |          |         |        |                |       |           |       | Yes       |        |         |         |        |           |            |
| 17-18   | Counterflow Rinse           |          |          |         |        |                |       |           |       |           |        |         |         |        |           |            |
| 19-21   | Triple Counterflow          |          |          |         |        |                |       |           |       |           |        |         |         |        |           |            |
| 22      | Drag Out Rinse              |          |          |         |        |                |       |           |       |           |        |         |         |        |           | Pump to NI |
| 23-28   | Nickel Plate                | Titanium | Titanium | RTD     | Yes    | 6/1000/20      | Cu.   | Titanium  | Yes   | Yes       | 6500   | Filter  |         | Yes    | 1         |            |
| 29-34   | Nickel Plate                | Titanium | Titanium | RTD     | Yes    | 6/1000/20      | Cu.   | Titanium  | Yes   | Yes       | 6500   | Filter  |         | Yes    | 1         |            |
| 35      | Anode Service               |          |          |         |        |                |       |           |       |           |        |         |         |        |           | Water Wand |
|         | Off Line                    |          |          |         |        |                |       |           |       |           |        |         |         |        |           |            |
|         | (5) Spin Dryers             |          |          |         |        |                |       |           |       |           |        |         |         |        |           |            |
|         | Loading System              |          |          |         |        |                |       |           |       |           |        |         |         |        |           |            |
|         | Material Handling System by |          |          |         |        |                |       |           |       |           |        |         |         |        |           |            |

