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1 INTRODUCTION

This Operating Manual must be studied and followed for the safe and efficient operation of the **Model 800 Armature Coating System**. Study this manual before locating and installing the equipment.

If there are any questions, please call:

ELECTROSTATIC TECHNOLOGY, INC.
A SUBSIDIARY OF NORDSON CORPORATION
4 PIN OAK DRIVE
BRANFORD, CT 06405

TELEPHONE: 203-488-8112
FAX: 203-483-8777

In future correspondence, please refer to the Model (800) and Serial Number (16655) of the Coating System.

2 SHIPPING

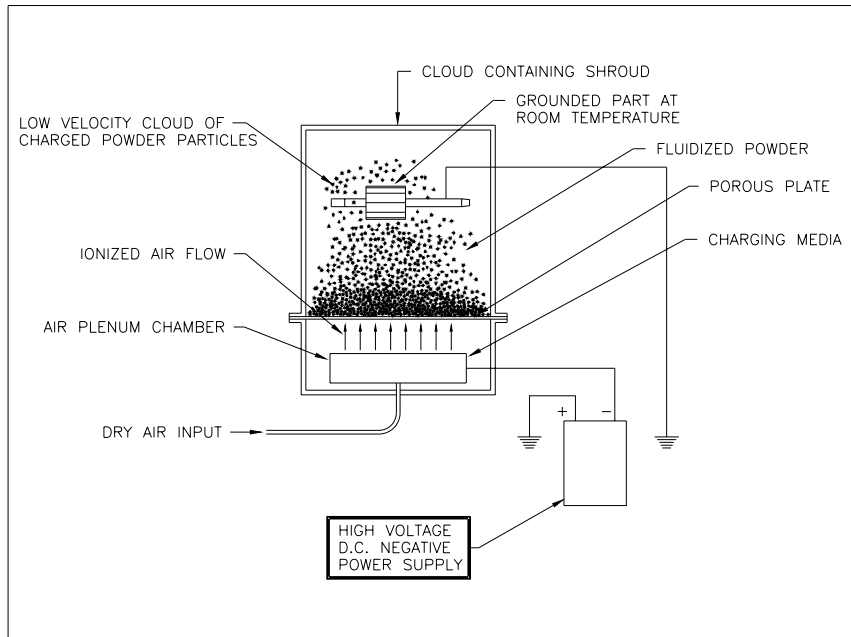
Sometimes equipment can be damaged in transit. An inspection of the shipping crates should be made upon delivery. When the equipment is removed, it should be carefully inspected to make sure the equipment is in good condition. If the equipment is damaged, the carrier's claim agent should be requested to prepare a report, a copy of which should be sent to:

ELECTROSTATIC TECHNOLOGY, INC.
A SUBSIDIARY OF NORDSON CORPORATION
4 PIN OAK DRIVE
BRANFORD, CT 06405

Electrostatic Technology Incorporated will then advise concerning repairs and replacements.

3 OPERATING PRINCIPLES

3.1 SCHEMATIC DIAGRAM OF AN ELECTROSTATIC COATER



3.2 PROCESS DESCRIPTION

Powder particles are aerated in a fluidizing chamber and are electrostatically charged by ionizing air forced through a porous plate at the base of the chamber. As the powder particles become charged, they repel each other to such a degree that they rise above the chamber forming a cloud or veil of charged particles. When a grounded object is placed in this cloud or conveyed through this cloud, the charged powder particles, because of their opposite potential, are attracted to it. As the particles become attached to the object, they form a uniform coating, being more attracted to exposed areas than to those already insulated. The longer the object is exposed to the cloud, the thicker the coating becomes, until saturation eventually takes place.

Coating thickness is controlled by applied voltage to the charging media and exposure time to the cloud. Because of the high voltage capability of the charging media, a sufficiently great potential exists between it and most substrates to permit even natural insulators to be coated. Unlike equipment with exposed electrodes, Electrostatic Technology, Inc.'s unique air ionization process charges the powder without permitting the powder, the object, or the operator to come in contact with the charging media.

4 GENERAL SAFETY

4.1 INTRODUCTION

This section contains general study instructions for using your Electrostatic Technology, Inc. (ETI) equipment. Task-and equipment-specific warnings are included in other sections of this manual where appropriate. Note all warnings and follow all instructions carefully. Failure to do so may result in personal injury, death, or property damage.

To use this equipment safely,

- Read and become familiar with the general safety instructions provided in this section of the manual before installing, operating, maintaining, or repairing this equipment.
- Read and carefully follow the instructions given throughout this manual for performing specific tasks and working with specific equipment.
- Store this manual within easy reach of personnel installing, operating, maintaining, or repairing this equipment.
- Follow all applicable procedures required by your company, industry standards, and government or regulatory agencies. Refer to the National Fire Protection Association (NFPA) standard 33 and to federal, state, regulatory agency, and local codes for rules and regulations covering installation and operation of powder coating systems.
- Obtain and read Material Safety Data Sheets (MSDS) for all materials used.

4.2 SAFETY SYMBOLS

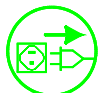
Become familiar with the safety symbols presented in this section. These symbols will alert you to safety hazards and conditions that may result in personal injury, death, or property and equipment damage.



WARNING: Failure to observe this warning may result in personal injury, death, or equipment damage.



WARNING: Risk of electrical shock. Failure to observe this warning may result in personal injury, death, or equipment damage.



WARNING: Disconnect equipment from line voltage. Failure to observe this warning may result in personal injury, death, or equipment damage.



WARNING: Risk of explosion or fire. Fire, open flames and smoking prohibited.



WARNING: Wear protective clothing, safety goggles, and approved respiratory protection. Failure to observe may result in serious injury.



WARNING: System or material pressurized. Release pressure. Failure to observe this warning may result in serious injury or death.



CAUTION: Failure to observe may result in equipment damage.

4.3 QUALIFIED PERSONNEL

"Qualified personnel" is defined here as individuals who thoroughly understand the equipment and its safe operation, maintenance, and repair. Qualified personnel are physically capable of performing the required tasks, familiar with all relevant safety rules and regulations, and have been trained to safely install, operate, maintain, and repair the equipment. It is the responsibility of the company operating the equipment to see that its personnel meet these requirements.

4.4 INTENDED USE



WARNING: Use of this equipment in ways other than described in this manual may result in personal injury, death, or property and equipment damage. Use this equipment only as described in this manual.

ETI cannot be responsible for injuries or damages resulting from nonstandard, unintended applications of its equipment. This equipment is designed and intended only for the purpose described in this manual. Uses not described in this manual are considered unintended uses and may result in serious personal injury, death, or property damage. Unintended uses may result from taking the following actions:

- Making changes to equipment that have not been recommended or described in this manual or using parts that are not genuine ETI replacement parts.
- Failing to make sure that auxiliary equipment complies with approval agency requirements, local codes, and all applicable safety standards.
- Using materials or auxiliary equipment that are inappropriate or incompatible with your ETI equipment.
- Allowing unqualified personnel to perform any task.

4.5 INSTALLATION

Read the installation section of all system components manuals before installing your equipment. A thorough understanding of system components and their requirements will help you install the system safely and efficiently.

- Allow only qualified personnel to install ETI and auxiliary equipment.
- Use only approved equipment. Using unapproved equipment in an approved system may void agency approvals.
- Make sure all equipment is rated and approved for the environment in which you are using it.
- Follow all instructions for installing components and accessories.
- Install locking, manual, shutoff valves in the air supply lines to the system. This allows you to relieve air pressure and lock out the pneumatic system before undertaking maintenance and repairs.
- Install a locking disconnect switch or breaker in the service line ahead of any electrical equipment.

4.5 INSTALLATION (continued)

- Use only electrical wire of sufficient gauge and insulation to handle the rated current demand. All wiring must meet local codes.
- Ground all electrically conductive equipment within 10 feet (3 meters) of the coating area. Ungrounded conductive equipment can store a static charge which could ignite a fire or cause an explosion if a hot spark is discharged.
- Install safety interlocks which shut down the coating system if the exhaust fan fails, a fire is detected, or other emergency situation develops.
- Make sure the coating area floor is grounded and that the operator's platform is grounded.
- Use only designated lifting points or lugs to lift and move heavy equipment. Always balance and block loads when lifting to prevent shifting. Lifting devices must be inspected, certified, and rated for a greater weight than the equipment being lifted.
- Protect components from damage, wear, and harsh environmental conditions.
- Allow ample room for maintenance, material supply, container drop-off and loading, panel accessibility, and cover removal.
- If safety devices must be removed for installation, install them immediately after the work is completed and check them for proper functioning.

4.6 OPERATION

Only qualified personnel, physically capable of operating the equipment and with no impairments to their judgement or reaction times, should operate this equipment.

Read all component manuals before operating a powder coating system. A thorough understanding of all components and their operations will help you operate the system safely and efficiently.

- Use this equipment only in the environments for which it is rated. Do not operate this equipment in humid, flammable, or explosive environments unless it has been rated for safe operation in these environments.
- Before starting this equipment, check all safety interlocks, fire-detection systems, and protective devices such as panels and covers. Make sure all devices are fully functional. Do not operate the system if these devices are not working properly. Do not deactivate or bypass automatic safety interlocks or locked-out electrical disconnects or pneumatic valves.
- Know where EMERGENCY STOP buttons, shutoff valves, and fire extinguishers are located. Make sure they work. If a component malfunctions, shut down and lock out the equipment immediately.

4.6 OPERATION (continued)

- Before operating, make sure all conductive equipment in the coating area is connected to a true earth ground.
- Never operate equipment with a known malfunction or leak.
- Do not attempt to operate electrical equipment if standing water is present.
- Never touch exposed electrical connections on equipment while the power is “ON”.
- Do not operate the equipment at pressures higher than the rated maximum working pressure of any component in the system.
- Know the pinch points, temperatures, and pressures for all equipment that you are working with. Recognize potential hazards associated with these and exercise appropriate caution.
- Wear shoes with conductive soles, such as leather, or use grounding straps to maintain a connection to ground when working with or around electrostatic equipment.
- Do not wear or carry metallic objects (jewelry or tools) while working with or around electrostatic equipment. Ungrounded metal can store a static charge and cause harmful shocks.
- Keep parts of the body or loose clothing away from moving equipment or parts. Remove personal jewelry and cover or tie back long hair.
- Wear National Institute of Occupational Safety and Health (NIOSH) approved respirators, safety glasses or goggles, and gloves, while handling powder containers, filling hoppers, operating coating equipment, and performing maintenance or cleaning tasks. Avoid getting powder coatings on your skin.
- Do not smoke in the coating area. A lit cigarette could ignite a fire or cause an explosion.
- If you notice electrical arcing in the coating equipment, shut down the system immediately. An arc can cause a fire or explosion.
- Shut off electrostatic power supplies before making adjustments to powder coating fluidized bed.
- Shut off moving equipment before taking measurements or inspecting workpieces.
- Wash exposed skin frequently with soap and water, especially before eating or drinking. Do not use solvents to remove coating materials from your skin.
- Do not use high-pressure compressed air to blow powder off your skin or clothes. High-pressure compressed air can be injected under the skin and cause serious illness or death. Treat all high-pressure fittings and hoses as if they could leak and cause injury.

4.7 LESS-OBVIOUS DANGERS

Operators should also be aware of less-obvious dangers in the workplace that often cannot be completely eliminated:

- Exposed surfaces on the equipment which may be hot or have sharp edges and cannot be practically safeguarded.
- Electrical equipment which may remain energized for a period of time after the equipment has been shut off.
- Vapors and materials which may cause allergic reactions or other health problems.
- Automatic hydraulic, pneumatic, or mechanical equipment or parts that may move without warning.
- Unguarded, moving mechanical assemblies.

4.8 IN THE EVENT OF A SYSTEM OR COMPONENT MALFUNCTION

Do not operate a system that contains malfunctioning components. If a component malfunctions, turn the system off immediately.

- Disconnect and lock out electrical power. Close and lock out hydraulic and pneumatic shutoff valves and relieve pressures.
- Allow only qualified personnel to make repairs. Repair or replace the malfunctioning component.

4.9 MAINTENANCE & REPAIR

- Allow only qualified personnel to perform maintenance, trouble-shooting, and repair tasks.
- Always wear appropriate protective devices and use safety devices when working on this equipment
- Follow the recommended maintenance procedures in your equipment manuals.
- Do not service or adjust any equipment unless another person trained in first aid and CPR is present.
- Use only genuine ETI replacement parts. Using unapproved parts or making unapproved modifications to equipment may void agency approvals and create safety hazards.
- Disconnect, lock out, and tag electrical power at a disconnect or breaker in the service line ahead of electrical equipment before servicing.

4.9 MAINTENANCE & REPAIR (continued)

- Do not attempt to service electrical equipment if there is standing water present. Do not service electrical equipment in a high-humidity environment.
- Use tools with insulated handles when working with electrical equipment.
- Do not attempt to service a moving piece of equipment. Shut off the equipment and lock out power. Secure equipment to prevent uncontrolled movement.
- Relieve air pressures before servicing equipment. Follow the specific instructions in this manual.
- Make sure that the room where you are working is sufficiently ventilated.
- If a "power on" test is required, perform the test carefully and then shut off and lock out power as soon as the test is over.
- Connect all disconnected equipment ground cables and wires after servicing the equipment. Ground all conductive equipment.
- Check interlock systems periodically to ensure their effectiveness.



WARNING: Operating faulty electrostatic equipment is hazardous and can cause electrocution, fire, or explosion. Make resistance checks part of your periodic maintenance program.

- Do not store flammable materials in the coating area or room. Keep containers or flammable materials far enough away from the coater to prevent their inclusion in a fire. If a fire or explosion occurs, flammable materials in the area will increase the chances and the extent of personal injuries and property damage.
- Practice good housekeeping procedures. Do not allow dust or powder coatings to accumulate in the coating area or on electrical equipment. Read this information carefully and follow instruction.

4.10 DISPOSAL

Dispose of equipment and materials used in operation and cleaning according to your local regulations.

5 **SPECIFIC EQUIPMENT SAFETY**

5.1 **GENERAL**

SOME VOLTAGES EMPLOYED IN PARTS OF THIS COATING SYSTEM ARE HIGH. REMEMBER THAT ANY SOURCE OF VOLTAGE CAN BE HAZARDOUS.

ONLY RELIABLE, DEPENDABLE, TRAINED EMPLOYEES SHOULD BE GIVEN THE RESPONSIBILITY OF OPERATION AND MAINTENANCE OF THIS SYSTEM.

ALL SECTIONS OF THIS MANUAL SHOULD BE STUDIED AND ALL POTENTIAL SAFETY HAZARDS IDENTIFIED AND UNDERSTOOD PRIOR TO INSTALLATION AND OPERATION OF THIS EQUIPMENT.

5.2 **POWDER**

As with all powder, and finely ground materials, there is a potential dust hazard. Powder recovery equipment must be kept in good working order for maximum safety. In the case of a powder spill; shovel, sweep, or vacuum the material up and dispose of it in accordance with applicable Local, State and Federal Ordinances. Blowing powder with air hoses is specifically **NOT** recommended.

There is a potential dust explosion hazard. Powder should be kept away from sparks or open flames. Personnel should not be permitted to smoke in the Powder Coating Area.

5.2.1 **Employee Health**

Personnel may be susceptible to the following effects of overexposure to powdered material:

5.2.1.1 Inhalation

Dust may cause irritation of the respiratory tract. Massive overexposure may produce pulmonary sensitization similar to a simple cold. Further exposure may lead to some type of asthmatic response.

5.2.1.2 Skin Contact

Powder may cause skin irritation such a Dermatitis or skin sensitization. Strict attention to proper personal hygiene practice is recommended.

5.2.1.3 Eye Contact

Powder may cause eye irritation.

5.2.1.4 First Aid Procedures

- Inhalation

Remove individual from exposure and call physician if breathing continues to be impaired.

- Skin Contact

Wash skin thoroughly with soap and water.

- Eye Contact

Flush eye gently with plenty of clean water for 15 minutes. If irritation persists, get medical attention.

5.2.2 **Special Protection**

Protective equipment may be worn in order to minimize contact with skin, eyes or clothing. Masks, rubber gloves, eye goggles and some type of coveralls may be suitable.

5.2.3 **Precautions**

Personnel should observe the following when working with powdered materials:

WASH THOROUGHLY BEFORE EATING OR SMOKING.

NO SMOKING IN THE VICINITY OF THE COATING AREA.

AVOID INHALATION OF DUST AND/OR FUMES.

5.2.4 **Material Safety Data Sheets (MSDS)**

For every powder which is used in the coating equipment, a Material Safety Data Sheet and/or toxicity sheet should be obtained. Personnel should be aware of potential health hazards, as well as proper methods of handling powdered materials.

6 AIR, ELECTRICAL, AND WATER REQUIREMENTS

6.1 POWDER COATING MACHINE

6.1.1 Air

A clean, oil free, dry supply of compressed air must be provided using 1 inch (25.4mm) I.D. line capable of supplying 75 SCFM (2.12 m³/min) @ 80 psi (5.6 bar) minimum to 100 psi (6.9 bar) maximum.

6.1.2 Electrical

480 Volts, 60 Hertz, 3-Phase, 100 Amp service plant power must be supplied to the main disconnect on located on the rear of the machine.

6.1.3 Water

6.1.3.1 Closed Loop Induction Heater Cooling System

Distilled water is required for the closed loop Induction Heater cooling system. Approximately 10 gallons (37.8 liters) of distilled water is required to fill the system.

6.1.3.2 Tower Water Requirements for Induction Heater Cooling

Customer must supply 7.5 gal/min (28.4L/min) at 30 psi (2.1 bar) of cooling water [85° F (29° C) max, 45° F (7° C) min] to the Heat Exchanger for the Closed Loop Induction Heater Cooling System.

6.2 INDUCTION HEATER

6.2.1 Electrical

Power for the Induction Heaters is supplied from the main power input specified in Section 6.1.2 above.

7 MECHANICAL FUNCTION: SEQUENCE AND DESCRIPTION

7.1 LOAD AREA

Lamination Stacks (with Jigs affixed) are manually placed on the ETI Roto-Flo™ Conveyor. The conveyor moves parts through each station of the Model 800.

NOTE: The drive system is located at this station.

7.1.1 Jig Loader Station

Jigs are pressed into the Lamination Stacks automatically in the Jig Loader Station.

The Operator loads 6 Lamination Stacks and 6 sets of Jigs into the Jig Loader Station (following the diagram inside station for proper positioning). The Station Cover must be closed for safety interlock and operation (NOTE: Station will not operate if Cover is not closed). When the Cover is closed, the Air Cylinder Rams are activated and push the Jigs into the Lamination Stacks.

Once this cycle is completed, the Operator opens the cover and removes the Stack/Jigs manually and loads them into the Roto-Flo™ Conveyor of the Model 800. There is a diagram at the Load Station that indicates the load position for the parts.

7.2 COATING MODULE

7.2.1 Coating Bed

The parts are conveyed through the coating bed. As the parts enter the bed area they pass through the cloud of charged particles and the parts are electrostatically powder coated.

A Suction Powder Pick-up Hose is supplied to pick up spilled powder in this area. The suction is available continuously when the Coating System is powered.

NOTE: This Pick-up Hose should be used **only** for clean uncontaminated powder.

Do not use it for general cleanup of dirt and trash.

7.2.2 Powder Level Sensor

A powder level sensing unit (Photohelic Gauge/Switch) controls the Powder Feeder to assure the correct level of powder in the coating bed at all times. The Powder Level Sensor consists of a control sensor with two inputs. The sensor reads the difference between the air pressure at the powder level in the coating bed and the ambient atmospheric pressure. The system logic requires that there be a difference between the

7.2.2 Powder Level Sensor (continued)

two pressure readings. As the two readings become similar, additional powder is fed into the coating bed.

The range of the control sensor has been pre-set at the E.T.I. factory and should not be touched or changed without consulting E.T.I. personnel. The Photohelic Gauge Meter that shows the pressure range is located on the front of the machine at the entrance to the Coating Bed.

On this gauge, when the needle comes in contact with the Left Set-Point, the Powder Feeder goes “ON”. It stays on until the needle makes contact with the Right Set-Point, which shuts off the powder feed.

Refer to the Dwyer Photohelic Gauge Manual in the Manufacturer’s Manuals (Section 23) for more specific information on this unit.



NOTE: The range of the Powder Level control sensor has been pre-set at the ETI factory and should not be touched or changed without consulting ETI personnel.

7.3 CLEANING STATION

7.3.1 Bulk Box

Initial bulk powder removal from the Masking Jigs and Roto-Flo Screw Conveyors is accomplished with Air Knives in the Bulk Box (last station) of the Coating Bed Hood. As powder is removed, it is reclaimed by the Powder Collector.

Air Knives #1, #2, #3, #4 are located in the Bulk Box.

7.3.2 O.D. Cleaning

The O.D. (outside diameter) Cleaning Station is located just after the Bulk Box. It utilizes a moving belt that contacts the core O.D as the parts rotate under it. The belt wipes powder off the lamination stack O.D. and is kept clean itself by a vacuum that removes powder and draws it back into the Powder Management System. The O.D. Cleaner is easily adjusted up or down, front or back, and can swivel for desired positioning.

Adjustments can be made by turning a small black knob located on the O.D. Cleaner. The position of the belt can be raised or lowered as needed. Generally the belt should run very close to the O.D., just barely touching it.

7.3.3 Air Knives

There are thirteen (13) air knives located in the Cleaning Module. The air knives are used to remove excess powder. The volume of airflow to the air knives is controlled and adjusted by flowmeters located on the Cleaning Control Panel.

The air knives are adjusted to be at least 0.1 inch (2.54 mm) from the Jig shaft and will not interfere with the part. They should also be adjusted on an angle in relation to the machine center to allow the knife to clean the entire length of the shaft.

The volume of air available to each air knife is adjusted by air flowmeters (0-200 SCFH) located on the Cleaning Control Panel. Airflow should be adjusted so that there is sufficient air to clean the part without disturbing powder in the surrounding area.

Air Knives #1, #2, #3 and #4 are located in the Bulk Box. Air Knives #5, #6, #7 and #8 are located after the O.D. Cleaner. Air Knife #9 is located in the O.D. Cleaning area and is used to clean powder from the endless O.D. Cleaning Belt. Air Knives #10, #11, #12 and #13 are located in the Induction Heating Station.

7.4 POWDER MANAGEMENT SYSTEM

A specially designed cloud containing Hood on the Coating Bed, with connecting duct-work, completely controls the powder cloud during the coating operation and transports undeposited powder to the Powder Management System via flexible hose.

Excess powder that is removed in the O.D. Cleaning Station and the Air Knife Station (from the armature O.D. and the Masking Jigs) prior to the Induction Heating Station is drawn into vacuum ducts located throughout the Machine and conveyed back to the Powder Management System.

Vacuum is created throughout the system by an assembly consisting of a blower fan and motor, and a set of Cartridge Filters which retain powder within the system. Electric and pneumatic circuitry provides a reverse pulse of air to clean the filter cartridges.

A loading chamber on the Powder Management System allows virgin material to be added to the system without spillage or contamination to the workspace. Refer to Section 11.2.1 for instructions on loading powder into the system.

The reclaimed powder from the filter cartridges falls into a hopper and then goes through a rotary air lock to the lower hopper where it is mixed with the virgin material. The level of the powder in the lower hopper is monitored by a level sensor.

The mixed powder is fluidized in the lower hopper by dry air that removes any moisture from the powder. This lower hopper acts as a Powder Drying Chamber. When the Powder Level Sensor in the Coating Bed senses a low powder level, powder is fed by means of a Helical Screw up to a Transition Weldment located just above the Coating Bed. From there the powder is allowed to trickle down into the Coating Bed. There is a magnet located in the Powder Feeder Transition Weldment to collect any metallic iron contamination in the powder.

7.4 POWDER MANAGEMENT SYSTEM (continued)

A Differential Pressure Gauge is located on the side of the Powder Management System. This provides an indication of how clean the filter cartridges are. A normal reading is between 1 and 5. A reading above 5 indicates that the filter cartridges are not being cleaned well enough. This is corrected by setting the unit so that the reverse cleaning pulses are more frequent and/or by increasing the air pressure to the pulse circuit. A reading below 1 would indicate that the filters are too clean, or that there is a hole in a filter, or there is air leakage past the filters. Refer to the Maintenance Section (14) of this manual for an explanation of this procedure.

7.5 SCRAP POWDER COLLECTOR

There is a secondary or Scrap Powder Collector provided to collect powder that has been removed from the Jigs in the Induction Heating Station and can no longer be used. This material has been subjected to radiant heat and may have begun to gel. It can not be reclaimed and must be discarded.

7.6 INDUCTION HEATING MODULE

This module uses an Induction Heater with a 50 kHz, 40 kW output. The purpose of this Induction Heater is to heat each part to the proper temperature to allow the powder to flow out and eventually cure. The Hood for this module must be closed or you can not turn "ON" the Induction Heater.

Adjustment controls for the Induction Heater are located on the Operator Main Control Panel. For information on temperature adjustment, refer to the Pillar Induction Heater Section in the Manufacturer's Manual binder.

The power control of the Induction Heater should be set as required to heat parts to the proper temperature as indicated by the following:

The powder on the parts should melt and have a wet look when the part is approximately 2/3 through the Induction Coil.

7.7 CURE MODULE

The Cure Module, located just after the Induction Heater, allows time for the epoxy on each part to cure. The insulated hood should always be in place while the machine is running, to retain the heat.

7.8 FINAL COOL MODULE

In this module the part passes over an Airflow Tube that directs air around each coated part. The air is moved using a rotor type exhausting fan. When the part leaves this module, it is cool enough to be handled by hand.

7.9 JIG UNLOADER STATION

The Operator unloads 6 coated Lamination Stacks with Jigs from the Unload Ramp and places them into the Jig Unloader Station (following the diagram inside station for proper positioning). The Station Cover must be closed for safety interlock and operation (NOTE: Station will not operate if Cover is not closed). When the Cover is closed, the Air Cylinder is activated and the Jigs are pulled apart, thus freeing the coated Lamination Stack

Once this cycle is completed, the Operator opens the cover and manually removes the Jig sets and coated parts.

7.10 REFRIGERANT AIR DRYER

This 100 SCFM Refrigerant Air Dryer with Particle and Coalescing Filters is supplied to ensure clean, oil free, moisture free air for fluidization of the powder in the coating unit. Refer to Manufacturer's Manual binder for more information on these units.

7.11 DEIONIZED WATER SYSTEM

The water that flows through the coils of the Induction Heaters is contained in a closed loop system. This system should be filled with about 10 gallons (37.8 liters) of distilled water. The distilled water is maintained in a de-ionized condition by replaceable cartridge elements. An indicator light signals when the element needs changing. This indicator light can be seen through a hole in a lower front panel of the Machine at the Cure Module.

7.12 INDUCTION HEATER COOLING WATER

Heat in the deionized water system is removed by customer-supplied cooling water that is fed through one tubing circuit in a Heat Exchanger. The heated deionized water flows through the other tubing circuit in the heat exchanger and is cooled by the customer supplied cooling water.

Locate the view hole in the front panel of the machine, at the Cure Module. This view hole has a label marked "Distilled Water Level". A distilled water temperature gauge is located on the sight gauge. The normal water temperature is 60° - 90°F (15° - 32°C). The water level can be checked by looking at the "HIGH/LOW" marking on the flowmeter.

7.13 PARTS COUNTER

A proximity switch located under the Roto-Flo Screw Conveyor in the Final Cool module acts as a parts counter. The count of parts can be read on the Panel View Display.

7.14 MAIN CONTROL CABINET

The Main Control Cabinet holds all of the electrical connections and switchgear for the system. Mounted on this cabinet is the pendent arm that holds the Control Panel containing the

Panel View and controls for equipment operation and High Voltage adjustment. Refer to the Main Control Panel Drawings in Section 8 of this Manual.

8 DESCRIPTION OF CONTROLS

8.1 MAIN CONTROL CABINET

The Main Control Cabinet holds all of the electric connections and switchgear for the system with the exception of the Induction Heater, which receives its power from a separate source. Mounted on this cabinet is the pendant arm holding the Operator Control Panel.

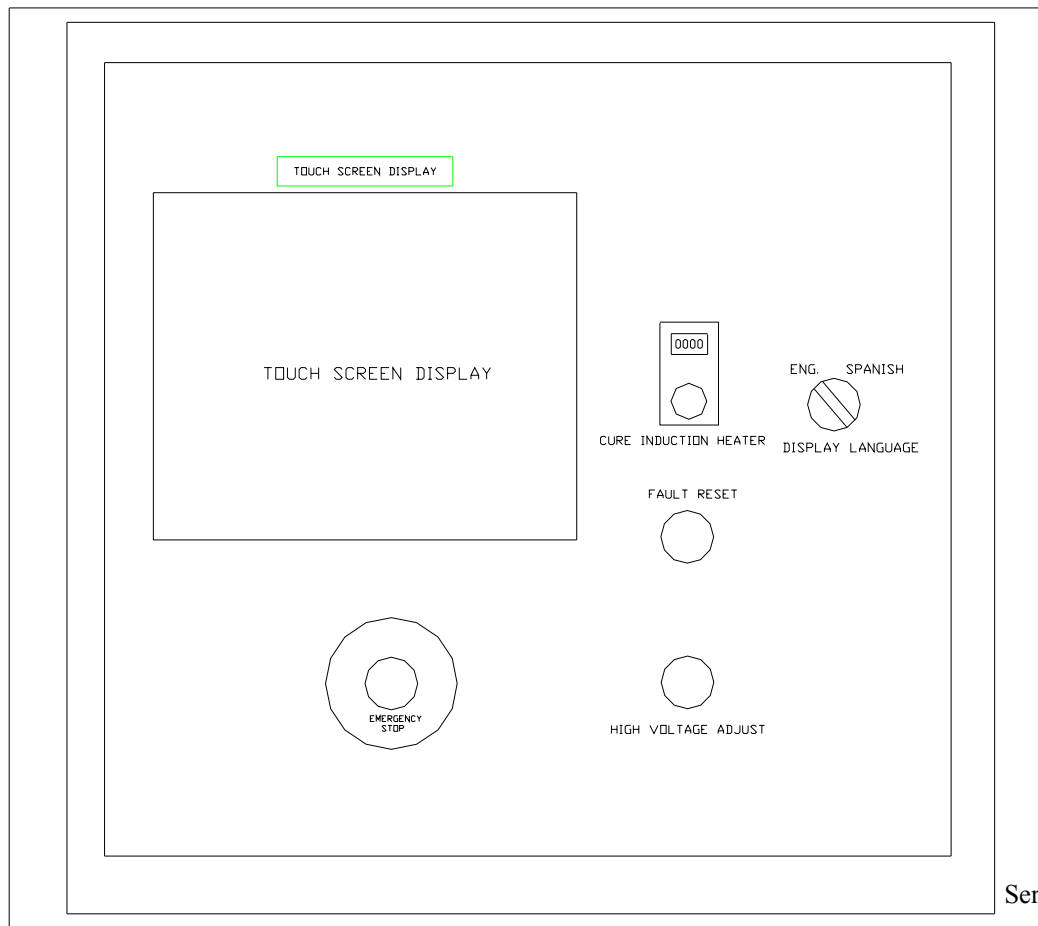
The following control is located on the Main Control Cabinet:

8.1.1 Main Electrical Control

MAIN DISCONNECT Turns on power to the Machine.

8.2 OPERATOR CONTROL PANEL

The Operator Control Panel hangs from a pendant arm mounted to the Main Control Cabinet. It contains the ViewPanel and controls for equipment operation and High Voltage adjustment. Refer to Operator Control Panel drawing.



8.2.1 Operator Control Panel Controls

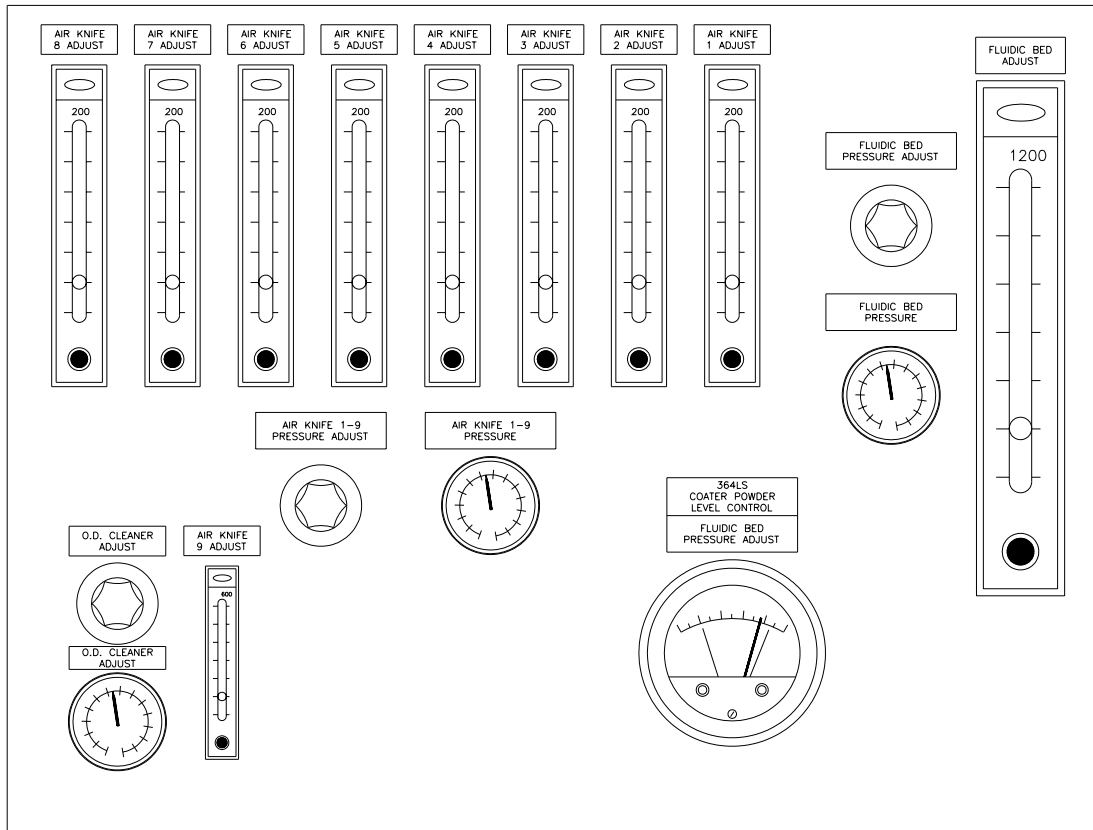
<p>TOUCH SCREEN Display</p>	<p>Used for operating the Coating Machine. See Section 9 in this Manual for a description of controls located on the PanelView screen.</p> <p>The “SCREEN LIST SELECTOR SCREEN” lists the available screens for operating the Coating Machine. The operator can access the desired screen using the UP, DOWN, and ENTER buttons.</p>
<p>EMERGENCY STOP Start/Stop Pushbutton</p>	<p>Push “In” to completely shutdown the system.</p> <p>Pull “Out” to turn on control power to the machine.</p> <p>The Refrigerant Air Dyer and the Cure Tunnel Oven will also turn on. There will be an approximate 10 minute wait before these items become ready.</p>
<p>HIGH VOLTAGE ADJUST Adjustable Potentiometer</p>	<p>Adjusts the voltage output of the (80kV) High Voltage Power Supply.</p>
<p>CURE INDUCTION HEATER POWER ADJUST Adjustable Potentiometer</p>	<p>Adjusts the output power of the Induction Heater.</p>
<p>CURE INDUCTION HEATER FAULT RESET Pushbutton</p>	<p>Resets the Induction Heater. The Induction Heater will have to be reset if the cooling pump is shut down or if the Induction Heater has faulted out.</p> <p>Reference Induction Heater manual.</p>
<p>DISPLAY LANGUAGE Switch</p>	<p>ENG. Position displays the English language. SPANISH position displays the Spanish language.</p>

8.3 STATION BEACON

A three-color stack light, located on top of the Main Electrical Enclosure, provides a visual indication of the current status of machine operation.

RED light	When flashing, indicates an Alarm "FAULT" condition.
AMBER light	When flashing, indicates "CAUTION" or an Alarm "WARNING" condition is present.
GREEN light	When flashing, indicates the machine is in Automatic Mode and Cycling (running without any faults).
BLUE Light	When flashing, indicates the machine is waiting for parts at the loading station.

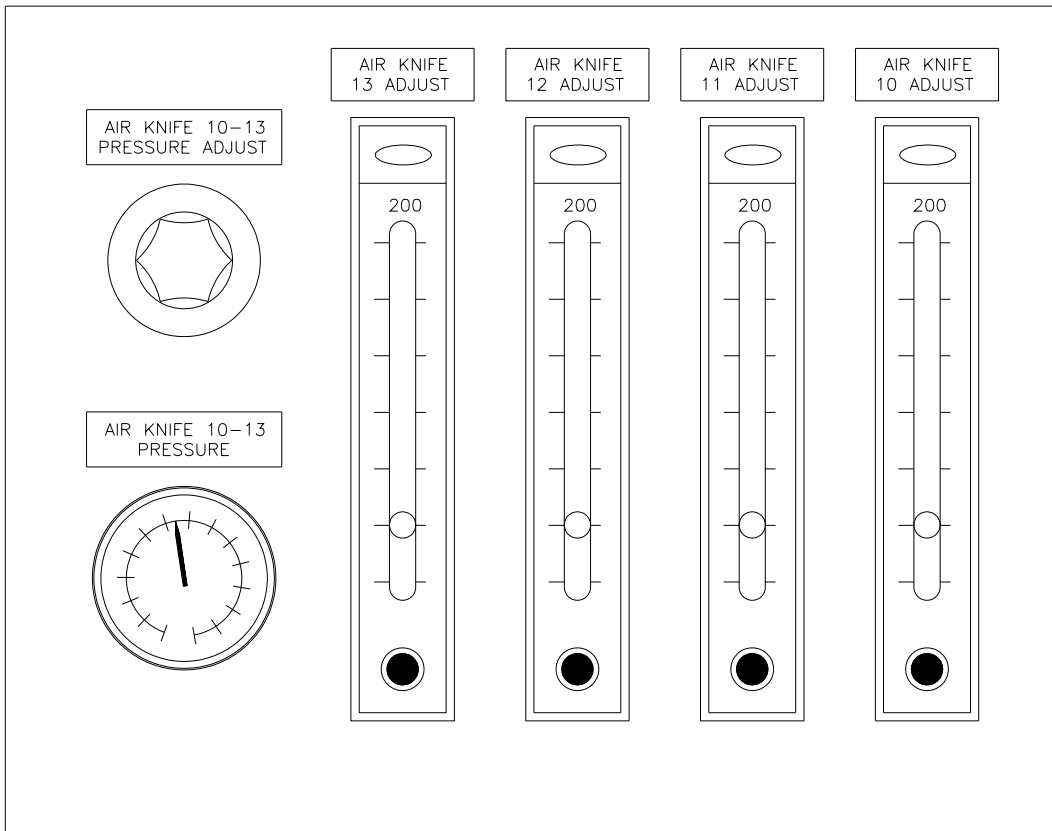
8.4 COATER/CLEANING PNEUMATIC CONTROL PANEL



8.4.1 Coater/Cleaning Pneumatic Controls

FLUID BED ADJUST (0-1200 SCFM) Air flowmeter	Adjusts and indicates the amount of fluidizing air being supplied to the Coater Fluidic Bed.
FLUIDIC BED PRESSURE (0-100 psi) Air pressure gauge	Indicates the amount of air pressure available to the Coater Fluidic Bed flowmeter.
FLUIDIC BED PRESSURE ADJUST Air regulator	Adjusts and regulates the air pressure available to the Coater Fluidic Bed flowmeter.
LEVEL SENSOR	Indicates set points for activation and deactivation of the Power Pump. Unit is factory set; always maintain a spacing of 10 between indicators.
AIR KNIVES (#1 - #9) ADJUST Air flowmeters	Adjusts and indicates the amount of fluidizing air being supplied to corresponding air knives.
AIR KNIVES (#1 - #9) PRESSURE Air pressure gauge	Indicates the amount of air pressure available to the air knives flowmeters.
AIR KNIVES (#1 - #9) PRESSURE ADJUST Regulator	Adjusts the amount of air pressure supplied to the air knives flowmeters.
O.D. CLEANER PRESSURE ADJUST Regulator	Adjusts the amount of air pressure supplied to the O.D. Cleaner Belt Vacuum.
O.D. CLEANER PRESSURE Air pressure gauge	Indicates the amount of air pressure available to the O.D. Cleaner Belt Vacuum.

8.5 INDUCTION PNEUMATIC CONTROL PANEL



8.5.1 Induction Pneumatic Controls

<p>AIR KNIVES (#10 - #13) ADJUST Air flowmeters</p>	<p>Adjusts and indicates the amount of fluidizing air being supplied to corresponding air knives.</p>
<p>AIR KNIVES (#10 - #13) PRESSURE Air pressure gauge</p>	<p>Indicates the amount of air pressure available to the air knives flowmeters.</p>
<p>AIR KNIVES (#10 - #13) PRESSURE ADJUST Regulator</p>	<p>Adjusts the amount of air pressure supplied to the air knives flowmeters.</p>

8.6 POWDER MANAGEMENT SYSTEM CONTROLS

The following controls are located on the Powder Collector:

POWDER FILTER BLOWDOWN (55 psi min./100 psi max.) Air pressure regulator	Adjusts and regulates the air pressure available for the automatic blowdown of the 4 Powder Collector Cartridges.
POWDER MANAGEMENT SYSTEM FILTER Differential pressure gauge	Indicates the difference in pressure across the Powder Management System Filter from the clean side to the he dirty side which indicates the level of cleanliness of the Cartridges. 0-4 normal reading; change above 4.
POWDER PUMP PRESSURE Air pressure gauge	Indicates the regulated air pressure to the Powder Pump.
POWDER PUMP PRESSURE ADJUST Air pressure gauge	Adjusts the amount of air pressure supplied to the Powder Pump.
FLUIDIZING HOPPER PRESSURE Air pressure gauge	Indicates the regulated air pressure to the Lower Fluidizing Hopper (underside of Powder Collector).
FLUIDIZING HOPPER PRESSURE ADJUST Regulator	Adjusts the amount of air pressure supplied to the Lower Fluidizing Hopper (underside of Powder Collector)

8.7 JIG LOADER STATION CONTROLS

JIG LOADER ADJUST Air Pressure Regulator and Gauge	Adjusts, regulates and indicates the air pressure to the Jig Loader ram cylinder.
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8.8 JIG UNLOADER STATION CONTROLS

JIG UNLOADER ADJUST Air Pressure Regulator and Gauge	Adjusts, regulates and indicates the air pressure to the Jig Unloader air cylinder.
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9 PANELVIEW SCREENS

The Allen-Bradley Panel View screens are designed with a touch-sensitive surface overlaying the monitor. Selections are made by touching the display directly. When a selection is made, the selection/indicator box changes to display a new message. For example, when SELECTED AUTO MODE is chosen, the box changes to AUTOMATIC MODE SELECTED. In addition to the selection/indicator boxes, there are also additional indicators and messages present on each screen to allow the operator to access station information efficiently.

The Model 800 Coating Machine includes the following Panel View screens:

The SCREEN LIST SELECTOR SCREEN displays the following list of screens used to operating the Coating Machine. The operator can access the desired screen by selecting (touching) the GO TO NEXT SCREEN button or by using the UP, DOWN and ENTER buttons.

MACHINE START-UP SCREEN

AUTO RUN SCREEN

MANUAL FUNCTION SCREEN

MACHINE STATUS SCREEN

ACTIVE ALARM LIST

ALARM HISTORY SCREEN

MACHINE I.D. SCREEN

9.1 SCREEN LIST SELECTOR SCREEN

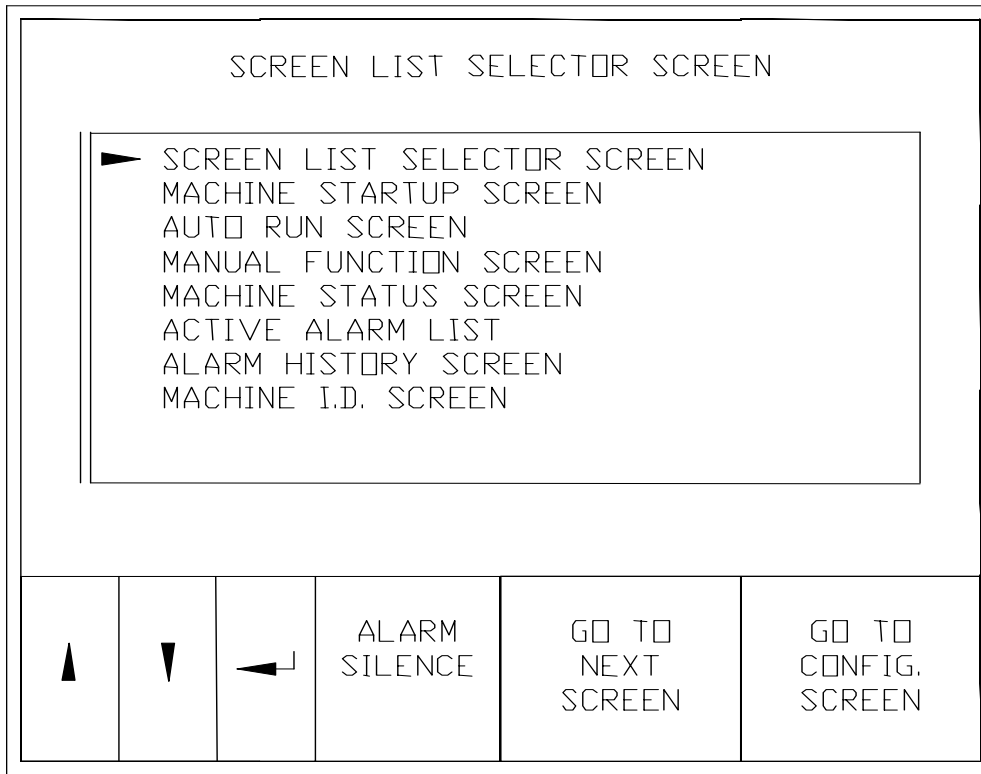
The SCREEN LIST SELECTOR SCREEN displays the lists of available screens for operating the Coating Machine. The operator can access the desired screen by using the Up, Down and Enter buttons or go to the next screen by selecting (touching) the GO TO NEXT SCREEN button. The ALARM SILENCE button silences the audible alarm.

The GOTO CONFIG. SCREEN button should only be access by qualified personnel. (If the Configuration Screen is accessed, select the RUN MODE button to place the Panel View back in normal operation).

The following screen buttons are located at the bottom of the display screens.

GO TO PREVIOUS SCREEN Screen Pushbutton	Displays the previous screen.
GO TO MAIN MENU SCREEN Screen Pushbutton	Displays the SCREEN LIST SELECTOR SCREEN
GO TO NEXT SCREEN Screen Pushbutton	Displays the next screen.
ALARM SILENCE Screen Pushbutton	Silence the audible alarm.

Figure 1 SCREEN LIST SELECTOR SCREEN

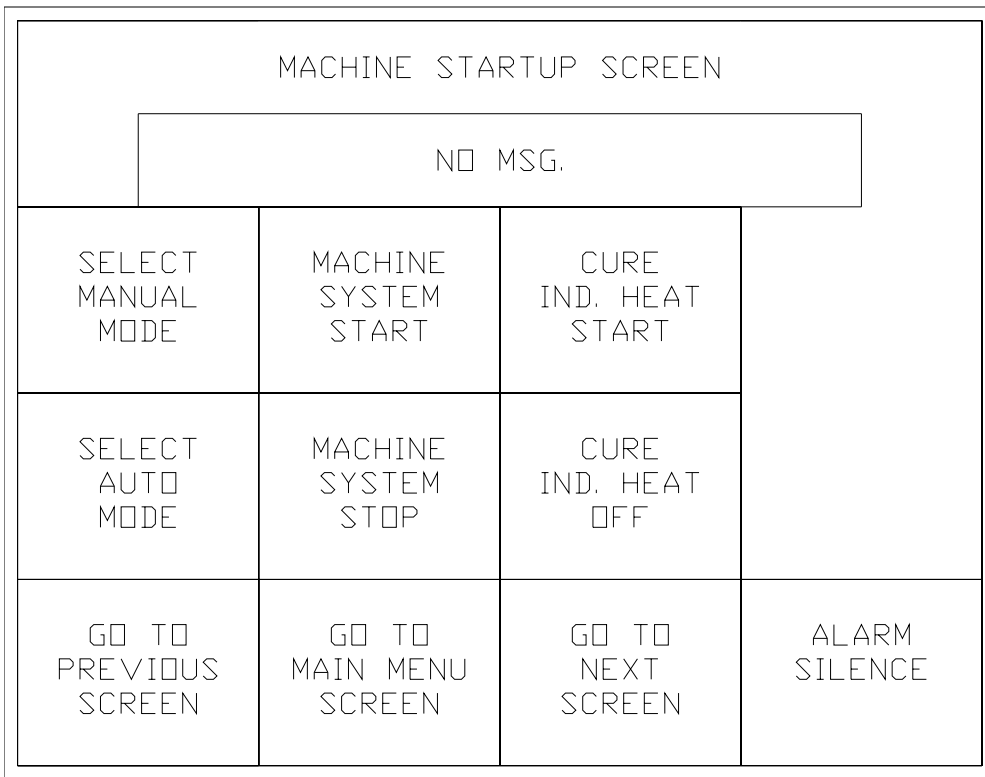


9.2 MACHINE START-UP SCREEN

The MACHINE START-UP SCREEN includes the following screen buttons along with selections to access different screens and silence the audible alarm.

<p>SELECT MANUAL MODE Screen Pushbutton</p>	<p>Set the machine for Manual operation.</p>
<p>SELECT AUTO MODE Screen Pushbutton</p>	<p>Set the machine for Automatic operation.</p>
<p>CURE IND. HEATER START Screen Pushbutton</p>	<p>Starts on the Cure Induction Heater, placing it in Ready Mode providing no Cure Induction Heater faults exists.</p> <p>Note: The Cure Induction Heater faults must be cleared before it can be started. Press the “FAULT RESET” pushbutton on the Operator Control Panel to clear the faults.</p>
<p>CURE IND. HEATER STOP Screen Pushbutton</p>	<p>Stops the Cure Induction Heater.</p>
<p>MACHINE SYSTEM START Screen Pushbutton</p>	<p>Start the Powder Collector (Powder Management System), Cure Induction Heater Coolant Pump, Final Cooling Blowers and Fume Exhaust Blower.</p>
<p>MACHINE SYSTEM STOP Screen Pushbutton</p>	<p>Stops the Powder Collector (Powder Management System), Cure Induction Heater Coolant Pump, Final Cooling Blowers and Fume Exhaust Blower.</p>

Figure 2 MACHINE START-UP SCREEN

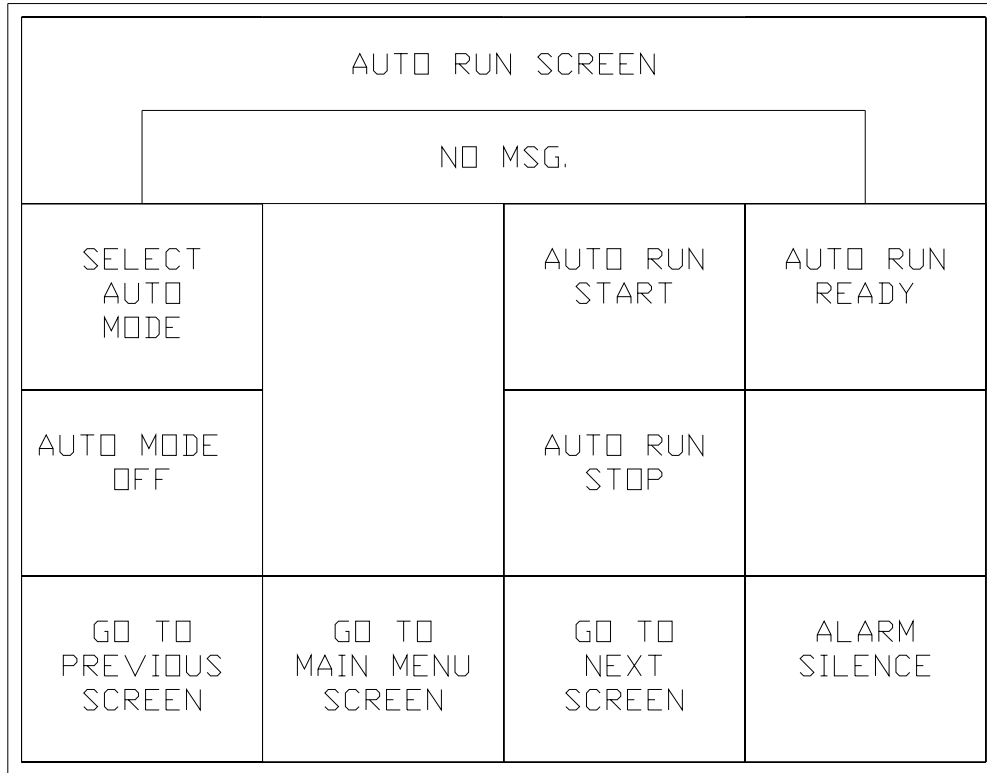


9.3 AUTO RUN SCREEN

The AUTO RUN SCREEN includes the following screen buttons along with selections to access different screens and silence the audible alarm.

SELECT AUTO MODE Screen Pushbutton	Enable the machine for Automatic operation.
AUTO MODE OFF Screen Pushbutton	Disable the machine for Automatic operation.
AUTO RUN START Screen Pushbutton	Starts the machine for Automatic operation.
AUTO RUN STOP Screen Pushbutton	Stops the machine Automatic operation.
AUTO RUN READY Screen Message	The Automatic operation is ready.
AUTO RUN NOT READY Screen Message	The Automatic operation is not ready. The Auto Mode may not be selected or an alarm fault will occur, preventing the machine from running in the Automatic Mode.
AUTO RUN OFF BY LOADER Screen Message	The Automatic operation was stopped due to a signal received from the Loader or the Equipment before the Powder Coating Machine.
AUTO RUN OFF BY UNLOADER Screen Message	The Automatic operation was stopped due to a signal received from the Unloader or the Equipment after the Powder Coating Machine.
AUTO RUN OFF BY OPERATOR Screen Message	The Automatic operation was stopped by the AUTO RUN STOP button or the AUTO MODE OFF button.

Figure 3 AUTO RUN SCREEN



9.4 MANUAL FUNCTION SCREEN

The MANUAL FUNCTION SCREEN includes the following screen buttons along with selections to access different screens and silence the audible alarm.

CONVEYOR START Screen Pushbutton	Starts the Conveyor in manual mode.
CONVEYOR STOP Screen Pushbutton	Stops the Conveyor in manual mode.
O.D. CLEANER START Screen Message	Starts the O.D. Cleaner in manual mode.
O.D. CLEANER STOP Screen Message	Stops the O.D. Cleaner in manual mode.
COATER START Screen Message	Starts the Coater in manual mode.
COATER STOP Screen Message	Stops the Coater in manual mode.
HIGH VOLTAGE START Screen Message	Turns “On” the Coater High Voltage Supply in manual mode.
HIGH VOLTAGE STOP Screen Message	Turns “Off” the Coater High Voltage Supply in manual mode.

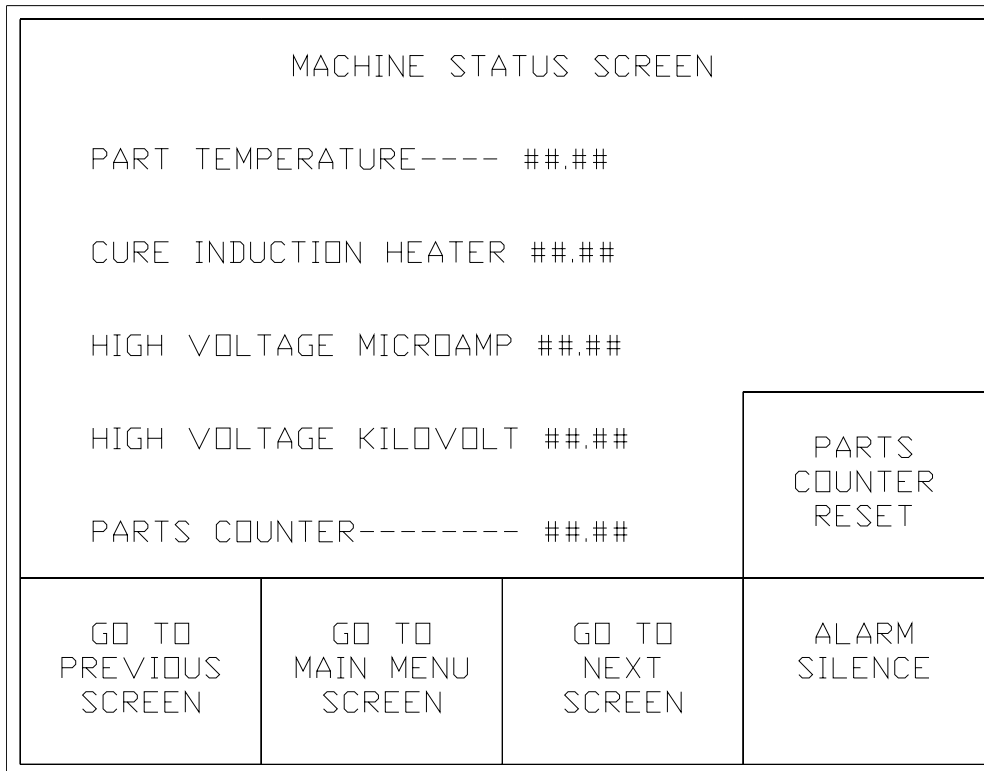
Figure 4 MANUAL FUNCTION SCREEN

MANUAL FUNCTION SCREEN			
NO MSG.			
CONVEYOR START	D.D. CLEANER START	COATER START	HIGH VOLTAGE START
CONVEYOR STOP	D.D. CLEANER STOP	COATER STOP	HIGH VOLTAGE OFF
GO TO PREVIOUS SCREEN	GO TO MAIN MENU SCREEN	GO TO NEXT SCREEN	ALARM SILENCE

9.5 MACHINE STATUS SCREEN

The MACHINE STATUS SCREEN displays Alarm Messages, the Cure Induction Heater (Cured Part) Temperature, the High Voltage Microamp, the High Voltage Kilovolt and Parts Counter along with PART COUNTER RESET button and selections to access different screens and silence the audible alarm.

Figure 5 MACHINE STATUS SCREEN

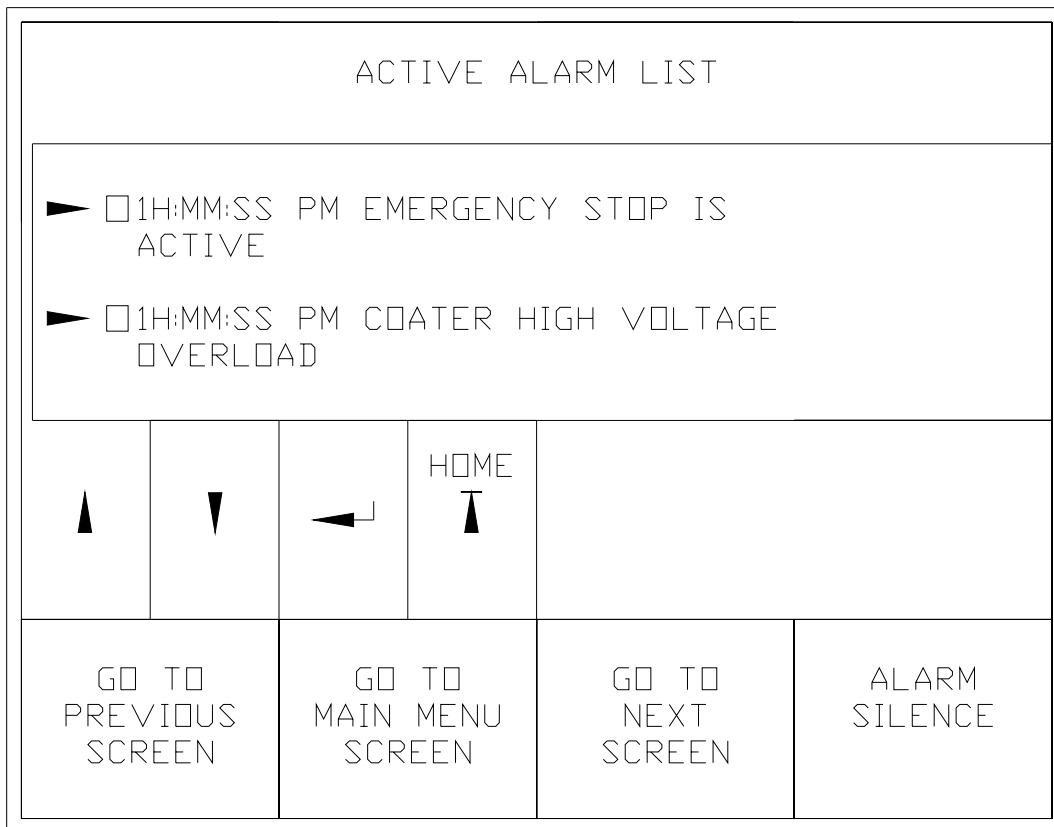


9.6 ACTIVE ALARM LIST

The ACTIVE ALARM LIST screen provides a list of active machine faults and selections to access different screens and silence the audible alarm.

- Emergency Stop is Active
- Coater High Voltage Overload
- Plant Air is Off of pressure is low
- Power Collector vacuum is low
- Etc.

Figure 6 ACTIVE ALARM LIST

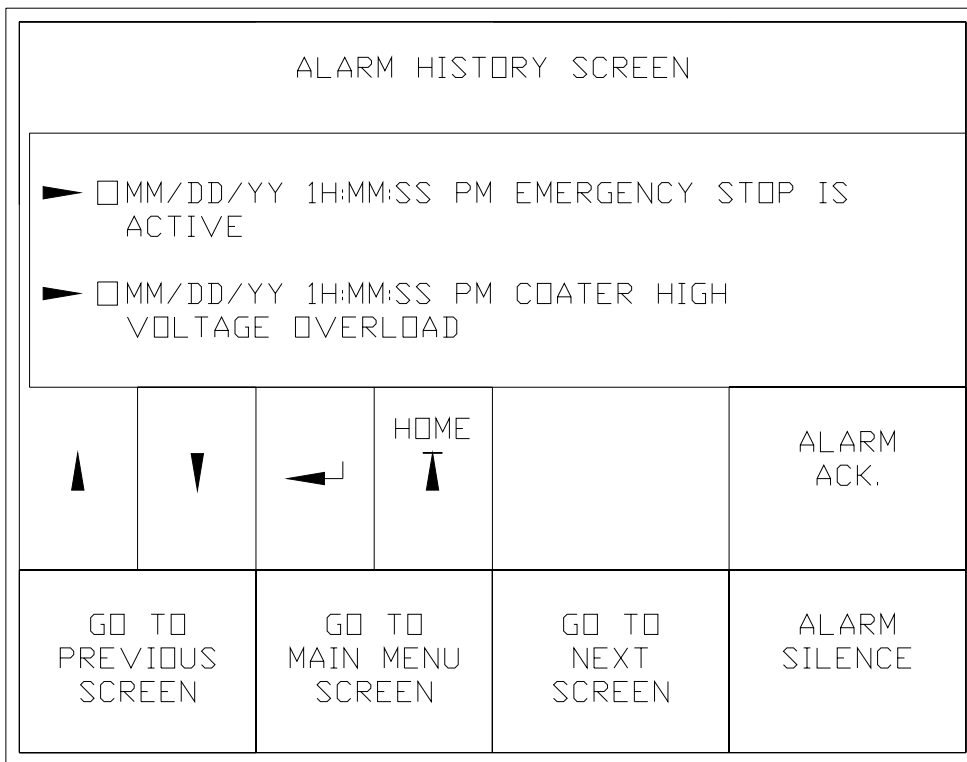


9.7 ALARM HISTORY SCREEN

The ALARM HISTORY SCREEN provides a history of machine faults and selections to access different screens and silence the audible alarm.

- Emergency Stop is Active
- Coater High Voltage Overload
- Plant Air is Off of pressure is low
- Power Collector vacuum is low
- Etc.

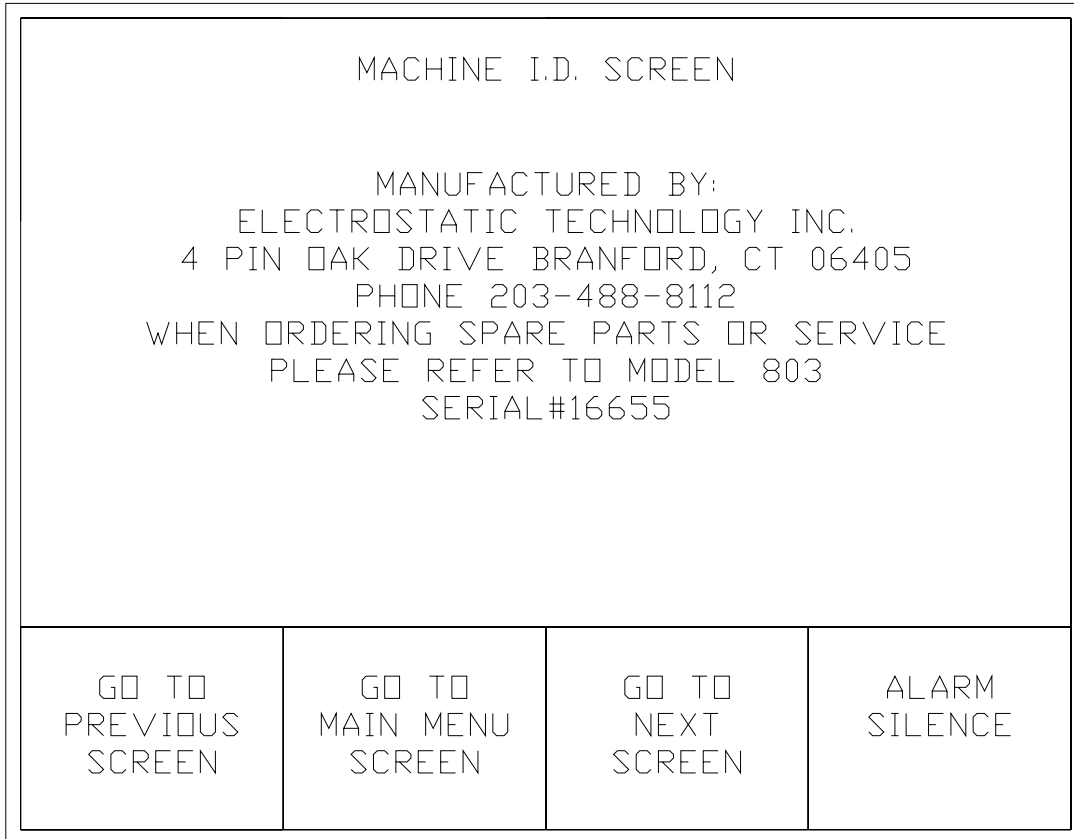
Figure 7 ALARM HISTORY SCREEN



9.8 MACHINE I.D. SCREEN

The MACHINE I.D. SCREEN provides manufacture information along with selections to access different screens and silence the audible alarm.

Figure 8 MACHINE I.D. SCREEN



9.9 ALARM BANNER SCREEN

The Alarm Banner Screen displays machine fault messages. These messages are also recorded on the Alarm History Screen along with the date and time.

MSG. #	DESCRIPTION
ALARM-1	EMERGENCY STOP IS ACTIVE
ALARM-101	ACTIVADO EL PARADO DE EMERGENCIA
ALARM-2	COATER HIGH VOLTAGE OVERLOAD
ALARM-102	SOBRE CARGADA ALTO VOLTAGE DEL RECUBRIMIENTO
ALARM-3	COATER FIRE SWITCH IS ACTIVE
ALARM-103	SWITCH ACTIVADO FUEGO DEL RECUBRIMIENTO
ALARM-4	PLANT AIR IS OFF OR PRESSURE IS LOW
ALARM-104	EL AIRE DE LA PLANTA ESTA APAGADO O LA PRESION ESTA BAJA
ALARM-5	AIR DRIER IS NOT READY
ALARM-105	EL SECADOR DE AIRE NO ESTA LISTO
ALARM-6	CONVEYOR CLUTCH IS TRIPPED
ALARM-106	EMBRIAGUE DE TRANSPORTADOR
ALARM-7	#1 POWDER COLLECTOR MOTOR OVERLOAD
ALARM-107	SOBRECARGA EN MOTOR DE COLECTOR DE POLVO #1
ALARM-8	POWDER COLLECTOR VACUUM IS LOW
ALARM-108	VACIO BAJO EN COLECTOR DE POLVO
ALARM-9	FUME EXHAUST BLOWER MOTOR OVERLOAD
ALARM-109	SOBRECARGA EN MOTOR DE EXPULSOR DE HUMO
ALARM-10	INDUCTION HEATER PUMP MOTOR OVERLOAD
ALARM-110	SOBRECARGA EN MOTOR DE BOMBA DEL CALE.DE IND.
ALARM-11	#1 FINAL COOLING BLOWER MOTOR OVERLOAD
ALARM-111	SOBRECARGA EN MOTOR DELSOPLADOR DE ENFRIAMIENTO FINAL#1
ALARM-12	#2 FINAL COOLING BLOWER MOTOR OVERLOAD
ALARM-112	SOBRECARGA EN MOTOR DELSOPLADOR DE ENFRIAMIENTO FINAL#2

9.9 ALARM BANNER SCREEN (continued)

MSG. #	DESCRIPTION
ALARM-13	PART TEMPERATURE IS TOO LOW
ALARM-113	LA TEMPERATURA DE LA PARTE ES MUY FRIA.
ALARM-14	#2 POWDER COLLECTOR BLOWER MOTOR OVERLOAD
ALARM-114	SOBRECARGA EN MOTOR DE SOPLADOR EN COLECTOR DE POLVO #2
ALARM-15	PART TEMPERATURE IS TOO HIGH
ALARM-115	LA TEMPERATURA DE LA PARTE ES MUY ALTA.
ALARM-16	CONVEYOR IS RUNNING SLOW
ALARM-116	EL TRANSPORTADOR ESTA CORRIENDO LENTO
ALARM-17	PARTS LOADER IS STARVED FOR PARTS
ALARM-117	EL CARGADOR DELAS PIESAS NECESITO MAS PIESAS
ALARM-18	CONVEYOR OFFLOAD RAMP IS FULL OF PARTS
ALARM-118	LA RAMPA DEL TRANSPORTADOR ESTA LLENA DE PIEZAS
ALARM-19	CURE TUNNEL IS NOT HOT
ALARM-119	EL TUNEL DE CURACION NO ESTA CALIENTE
ALARM-20	EXTERNAL SIGNAL HAS STOPPED MACHINE
ALARM-120	LA SENAL DE AFUERA APAGO LA MAQUINA
ALARM-21	POWDER IS LOW IN THE COATER
ALARM-121	NIVEL DE POLVO BAJO EN RECUBRIDOR
ALARM-22	POWDER HOPPER IS LOW AND NEEDS FILLING
ALARM-122	NIVEL DE POLVO BAJO EN TOLVA Y NECESITA LLENARLO
ALARM-23	CURE INDUCTION HEATER GUARD IS OPEN
ALARM-123	ABIERTA LA GUARDA DEL CALEN.DE INDUC.DE CURACION
ALARM-24	CURE INDUCTION HEATER IS NOT READY
ALARM-124	EL CALENTADOR DE INDUCCION NO ESTA LISTO.
ALARM-25	CURE INDUCTION HEATER FAULTED
ALARM-125	FALLA EN CALENTADOR DE INDUCCION DE CURACION
ALARM-26	AIR PRESSURE SWITCH 1:1/0PS MAY BE BAD
ALARM-126	EL SWITCH DE LA PRESION DE AIRE 1:1/0PS PUEDE ESTAR DANADO

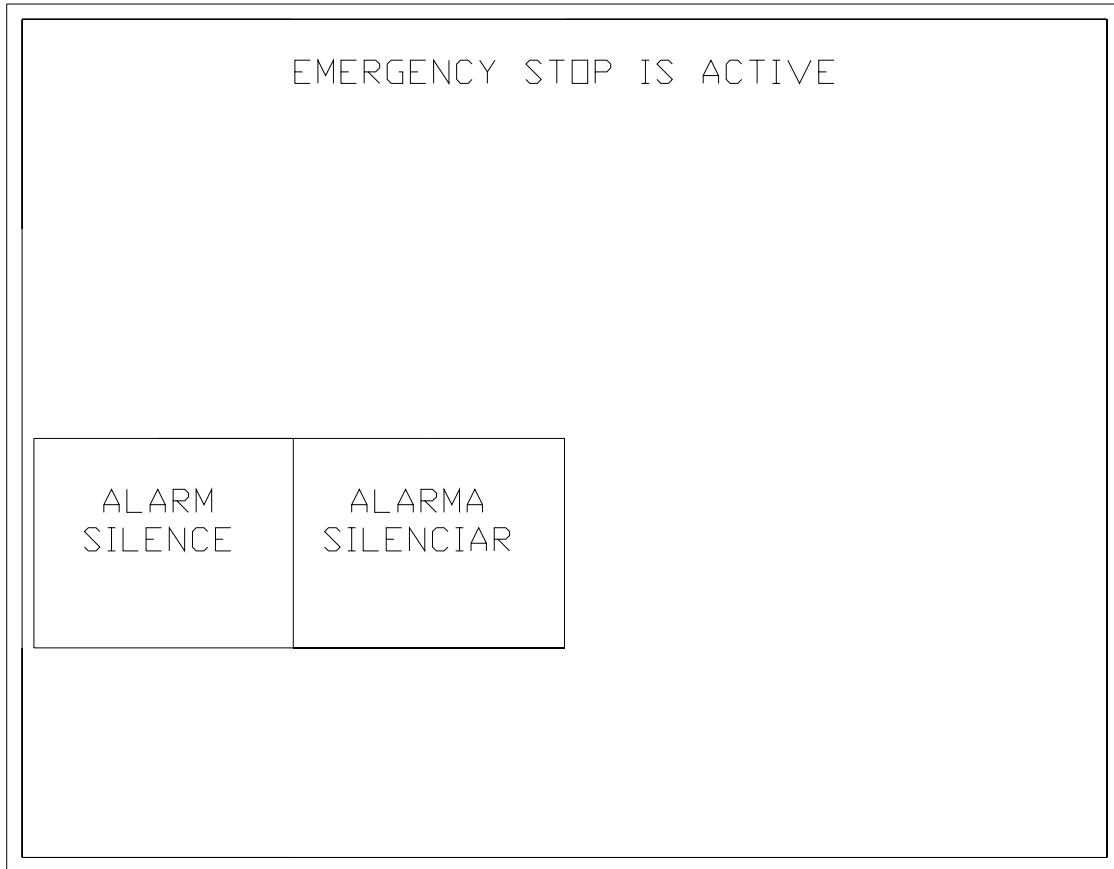
9.9 ALARM BANNER SCREEN (continued)

MSG. #	DESCRIPTION
ALARM-27	AIR DRIER SWITCH I:1/1TAS MAY BE BAD
ALARM-127	EL SWITCH DE SECADOR DE AIRE 1:1/1TAS PUEDE ESTAR DANADO
ALARM-28	COATER POWDER LEVEL CONTROL 465LS MAY BE BAD
ALARM-128	EL CONTROLADOR DE NIVEL DE POLVO 465LS PUEDE ESTAR DANADO
ALARM-29	INDUCTION HEATER WATER TEMPERATURE SWITCH I:1/4TAS MAY BE BAD
ALARM-129	EL SWITCH DE TEMPERATURA DEL CALENTADOR DE INDUCCION DE AGUA I:1/4TAS PUEDE ESTAR DANADO
ALARM-30	PWDR. COLLECTOR VACUUM SWITCH I:1/5PS MAY BE BAD
ALARM-130	EL SWITCH DE VACIO DEL COLECTOR DE POLVO I:1/5PS PUEDE ESTAR DANADO
ALARM-31	CURE TUNNEL TEMPERATURE SWITCH I:2/0TAS MAY BE BAD
ALARM-131	EL SWITCH DE TEMPERATURA DEL TUNEL DE CURACION I:2/0TAS PUEDE ESTAR DANADO
ALARM-32	CONVEYOR CLUTCH SWITCH I:2/8LS MAY NEED ADJUSTING
ALARM-132	EL SWITCH DE EMBRIAGUE DEL TRANSPORTADOR I:2/8LS PUEDE ESTAR DANADO
ALARM-33	PROXIMITY SWITCH I:2/12PRS MAY BE BAD OR PART MISSING FROM CONVEYOR
ALARM-133	SWITCH DE PROXIMIDAD I:2/12PRS DEL TRANSPORTADOR PUEDE ESTAR DANADO O FALTA PIEZA
ALARM-34	PROXIMITY SWITCH I:3/6PRS MAY BE BAD OR PART MISSING FROM CONVEYOR
ALARM-134	SWITCH DE PROXIMIDAD I:3/6PRS DEL TRANSPORTADOR PUEDE ESTAR DANADO O FALTA PIEZA
ALARM-35	SPARE
ALARM-135	REPUESTO
ALARM-36	INDUCTION HEATER COOLING WATER IS HOT
ALARM-136	EL AGUA DE ENFRIAMIENTO DEL CALEN.INDUC.ESTA CALIENTE
ALARM-37	INDUCTION HEATER DID NOT COME ON
ALARM-137	CALENTADOR INDUCCION NO ENCENDIDO

9.9 ALARM BANNER SCREEN (continued)

MSG. #	DESCRIPTION
ALARM-38	PROCESSOR BATTERY IS LOW AND NEEDS TO BE REPLACED
ALARM-138	BATERIA PROCESADOR BAJA.REEMPLAZARLA
ALARM-39	#1 POWDER COLLECTOR AIR LOCK MOTOR OVERLOAD
ALARM-139	COLECTOR POLVO #1 EL SEGURO DEL MOTOR DE AIRE ESTA SOBRE CARGADO
ALARM-40	POWDER FEEDER MOTOR OVERLOAD
ALARM-140	EL MOTOR DE ALIMENTACION DE POLVO ESTA SOBRE CARGADO
ALARM-41	PART CRASHED IN INDUCTION HEATER
ALARM-141	LA PIESA CHOCARON DENTRO DEL CALENTADOR INDUCCION
ALARM-42	MACHINE STOPPED DUE TO LOW POWDER IN COATER BED
ALARM-142	MAQUINA SEPARA SI ESTA BAJA DE POLVO LACAMA DE FLUIDO
ALARM-43	#43 SPARE
ALARM-143	#143 REPUESTO
ALARM-44	#44 SPARE
ALARM-144	#144 REPUESTO
ALARM-45	#45 SPARE
ALARM-145	#145 REPUESTO
ALARM-46	#46 SPARE
ALARM-146	#146 REPUESTO
ALARM-47	#47 SPARE
ALARM-147	#147 REPUESTO
ALARM-48	#48 SPARE
ALARM-148	#148 REPUESTO

Figure 9 ALARM BANNER SCREEN



10 **INITIAL SYSTEM INSTALLATION**

The following procedure should be used for the initial installation of the Armature Coating System:

1. Uncrate all equipment from the shipping containers and crates. An inspection of the shipping containers should be made upon delivery in accordance with Section 2 of this Manual.
2. Place the Main Machine in the desired location.
3. The Main Machine may have been shipped in two (2) or three (3) sections. These sections should be connected together with the bolts provided at one or both of the following points:
 - at the Induction Heating Station/Cure Tunnel (if two (2) sections);
 - also at the Coating Bed Station (if shipped in three sections)
4. Adjust the height and level the Main Machine.
5. Locate peripheral equipment such as the Powder Management System, Scrap Powder Collector, Refrigerant Air Dryer, and Induction Heater in proper places with respect to the Main Machine. Refer to the Layout Drawing of the System. Note that the Powder Management System Loading Station sight window and rubber gloves face the Induction Heater. Also, the Loading Door faces the rear of the Induction Heater.
6. Level all the peripheral equipment and make all necessary mechanical connections to attach peripheral equipment to the Main Machine.
7. Re-connect all wiring, piping, and hoses for electrical and pneumatic operation. All have been clearly marked numerically or alphabetically so that like numbers or letters will be connected together.
8. Re-connect the Roto-Flo Transport Screws and Lifting Rails at the point they have been separated (Induction Heater exit).
9. Install the Powder Collector Filter Cartridges in the Powder Collector section of the Powder Management System. Start at the back of the cabinet and work towards the door. Place the Hanger Rod through the center of the Filter Element. Secure the Filter Element to the Hanger Rod by installing the special rubber washer Gasket, Wing Nut, and Protective Cap to the threads on the end of the Hanger Rod. Do not tighten at this time.

Hang this Filter Element Assembly from the Venturi Bracket in the top of the Cabinet. Turn the Wing Nut clockwise until the Filter Element bottoms out on the stops. The Filter Element must be tightened until it can not be twisted by hand.

10. Prepare ducts from the System as required. Connect to the Powder Collector, Induction Heater Hood, Cure Tunnel and Final Cooling Blower. These ducts are used either to vent the Ovens or reduce noise in the System area.

10 INITIAL SYSTEM INSTALLATION (continued)

11. Fill the Induction Heater Cooling Water Tank, located under the Cure Module with 10 gallons (37.8 liters) of de-ionized water. The Fill Tube is located on the rear of the Machine behind the Cure Module. Check for leaks.

NOTE: If the unit was shipped with anti-freeze, it must be flushed prior to filling.

12. Remove the front panel from the Cure Module. Located the De-Ionizer case. Install De-Ionizer Filter (Element) Cartridge into the De-Ionizer case. The Filter Cartridge has been shipped in a box taped to the side of the De-Ionizer case.
13. Prior to connecting the plant air supply to the System, blow the lines out to make sure nothing is in them that could cause a clog in the System air supply. Make sure that the Main System Air Shut Off Valve (red handle connected to the Refrigerant Air Dryer) is closed (parallel to the blue pipe) at this time. Connect the plant air supply to the Main System Air Connection (blue pipe) located on the Refrigerant Air Dryer behind the main coating machine. Turn the red Air Supply Valve handle "ON" and allow air to circulate through the coating machine. Check for air leaks by listening for escaping air.
14. At this time connect the main electrical power to the E.T.I. System. Make sure that air connections have been properly made in the equipment and that the De-ionized Water Tank has been filled.

DO NOT TRY TO OPERATE THE SYSTEM AT THIS TIME.

15. At this point, contact an E.T.I. Service Engineer for start-up assistance.

11 **PREPARATION FOR OPERATION**

These instructions for installing, operating, and maintaining the Model 800 Armature Coating System must be followed for its safe and efficient operation. In particular, precautions should be observed whenever the unit is operated. Study this manual **BEFORE** installing or operating the equipment. Some voltages employed in this equipment are high. Remember that any source of voltage can be hazardous.

11.1 **GENERAL**

Properly coated and cured parts are subject to several variables such as: size of part, conveyor speed, type of powder, and ambient temperature and humidity conditions. Care must be taken at all times when setting up the Machine for a particular product under specific conditions in order to obtain the desired results. This section contains a general explanation of the adjustments that can be made. Once specific settings have been determined for each product, they should be charted and made a set-up requirement prior to a production run.

11.2 **POWDER MANAGEMENT SYSTEM**

11.2.1 **Loading Powder**

Follow this procedure:

Step 1 – Remove tie-wrap from powder bag and open loading door.

Step 2 – Load only one bag of powder at a time; do not over-fill hopper. Leave about one foot of clear space to the screen in the loading chamber.

Step 3 – Close loading door.

Step 4 – Place hands in Rubber Gloves.

Step 5 – Empty the bag inside the loading chamber.

Step 6 – Shake the bag so that all the powder falls into the hopper below.

NOTE: Do not allow foreign items (such as bag tie-wraps) to fall into the Hopper. They may jam the Powder Feeder Screw.

Step 7 – Open the loading door, remove the empty bag, and close the loading door.

11.2.2 Powder Maintenance

Most powders are hygroscopic. An attempt should be made to finish the days run with a minimum of powder left in the Powder Collector Hopper. The Hopper should be filled at the beginning of the day and be left almost empty at the end of the day. All powder containers (bags, barrels, hoppers, etc.) should be kept tightly closed.

NOTE: Do not mix different types of powder.

11.3 COATING MODULE

11.3.1 Coating Bed

Press COATER ON button on MANUAL SETUP SCREEN. If the Coating Bed has been cleaned out and is empty, the automatic feature of the Powder Level Sensor will fill the bed with powder. Adjust the Coating Bed Air Flowmeter until the powder is uniformly fluidized (bubbling evenly) over the entire surface. Adjust the "gate valves" on the Powder Collector/Coater exhaust ducts to the point where it prevents powder from spilling out of the Coating Bed Hood.

11.3.2 Powder Deposition

Powder deposition on the part can be controlled by the density of the cloud and/or the High Voltage. Increasing the cloud density beyond a certain point reduces the effectiveness of the High Voltage and makes the Coater over-sensitive to the point where small variations in line voltage or atmospheric conditions will affect coating from part to part. Cloud density can be varied by two methods:

11.3.2.1 *Fluidizing Air*

Increasing the fluidizing air will increase the cloud density (deposition). Decreasing the fluidizing air will decrease the cloud density. Increasing the air pressure beyond the uniformly fluidized point (bubbling) should never be done. Coating will become uncontrollable with uneven deposition and undue stress will be placed on the porous plate.

11.3.2.2 *Powder Level*

The powder level height in the fluidizing bed can be changed. Raising the level will bring an increasingly denser portion of the cloud closer to the part. It is not recommended to increase (or decrease) the height more than 1/2 in. (12.7 mm) beyond that set at installation. Standard setting is approximately 1 inch (25.4 mm) above the porous plate surface. Consult E.T.I. personnel for any changes

beyond this point. To change the level, loosen the hex fitting where the level sensor probe tube goes through the Coating Bed Hood. Next, gently raise or
11.3.2.2 Powder Level (continued)

lower level sensor probe tube and re-tighten the hex fitting. Note: If the level sensor probe (tube) has a flat spot at the base, it must remain parallel to the porous plate.

11.3.3 High Voltage

Set the High Voltage Adjust to the Kilovolt setting required for production line condition.

11.4 CLEANING STATION

11.4.1 Bulk Box

Turn "ON" the Powder Management System, Roto-Flo Screws, Coating Bed and High Voltage. Run coated parts and adjust the Bulk Box Air Knives positions and the Air Control Valves for adequate cleaning of the Masking Jigs under production line conditions.

11.4.2 O.D. Cleaner

Turn "ON" the Powder Management System, Roto-Flo Screws, Coating Bed and High Voltage. Run coated parts and adjust the O.D. Cleaner Belt position for adequate cleaning of the armature O.D. under production line conditions.

11.4.3 Air Knives

Turn "ON" the Powder Management System, Roto-Flo Screws, Coating Bed and High Voltage. Run coated parts and adjust the Air Knives positions and the Air Control Valves for adequate cleaning of the Masking Jigs under production line conditions.

11.5 INDUCTION HEATER

To operate the Induction Heater, the CONVEYOR START must be selected on the on MANUAL SETUP SCREEN. Then the INDUCTION HEATER START must be selected on the Machine Startup Screen (wait one minute to allow the Water Pump to increase water pressure in the Induction Heater before pressing INDUCTION HEATER START on the Machine Startup Screen). Next, select the INDUCTION HEAT POWER ON located at the end of the Cleaning Station. The unit will be "ready", but will not generate heat until the armatures pass the Proximity Switch at the entrance to the Induction Coil. The INDUCTION HEATER POWER METER on the pendant control panel will show the level of heat power being generated.

11.6 CURE MODULE

Be sure to keep the Hood closed while parts are passing through the Cure Module. Operating with the Hood open could have the following results:

- Interference with the temperature control preventing proper cure of the coating
- Burning out the heating units

12 **STATION START-UP PROCEDURE**

12.1 OVERVIEW

There are two modes for operating the Coating Machine; Automatic and Manual. This section will provide the operating personnel with a thorough understanding of the start-up procedures. Supervisory personnel should occasionally check the Coating and Induction Heater operation and make adjustments as required to ensure that proper coating, cleaning, and curing of stacks are maintained.

Assuming that all of the air, electrical, and water requirements have been connected and supplied to the Coating Machine, the following can be performed:

- Step 1 Make sure the Disconnect to the Main Electrical Enclosure and the Induction Heater Unit are in the "ON" (up) position.
- Step 2 Pull "Out" the EMERGENCY STOP Start/Stop Pushbutton to turn on control power to the machine.
- Step 3 The SCREEN LIST SELECTOR SCREEN should appear. If not, call it up.
- Step 4 The Refrigerant Air Dryer will turn "ON". There will be a delay of up to 5 minutes for the Refrigerant Air Dryer to cool and become "READY". The Coating Machine will not operate until the Refrigerant Air Dryer is "READY". The "AIR DRYER NOT READY" Alarm Message can be monitored on the Active Alarm Screen. This Message will disappear once the Air Dryer becomes "READY".
- Step 5 Make sure that the TEE handle for the main air supply is pulled out (on).
- Step 6 Make sure that all Emergency Stop Buttons are pulled out and the Cure Induction Heater and Cure Tunnel doors are closed.
- Step 7 Select MACHINE STARTUP SCREEN from the SCREEN LIST SELECTOR SCREEN.
- Step 8 Wait until the AIR DRYER IS NOT READY message no longer appears on the screen.
On the MACHINE STARTUP SCREEN, select MACHINE SYSTEM START. After 15 seconds, Press the CURE INDUCTION HEATER FAULT RESET pushbutton. Then select, CURE IND.HEATER START. Select MANUAL MODE or AUTO MODE.
- Step 9 Proceed to the AUTO RUN SCREEN or MANUAL FUNCTION SCREEN.

NOTE: For initial startup, after installation, proceed to MANUAL MODE.

NOTE:

Fault and warnings alarms are reported on the Banner Screen (along with an audible alarm and the Red or Amber light on the Beacon Station). Acknowledging the alarms by pressing the Acknowledge button on the Banner Screen removes the Alarm Message from the Banner Screen. To help clear any alarms, an alarm history of all previous faults can always be called up on the Alarm History Screen.

12.2 MANUAL MODE - COATING MACHINE

The Manual Mode is used for Set-up, Experimentation, Maintenance, and Cleaning (for example, when it is desired to have the Powder Management System "ON" and not the Coating Bed). This Mode is also used when re-setting the Conveyor Clutch and re-setting the Proximity Switches in case parts are coming off the Conveyor in the Coating Bed.

When used for Experimentation, the various Conveyor speeds, High Voltage settings, and Air Pressure settings should be recorded under several production line situations in order to chart and fix these settings for future use. Each individual system can be turned "ON" and "OFF" within the limits of the priority circuitry for setting-up or troubleshooting.

- Step 1 Be sure all aspects of the Machine Operation are understood.
- Step 2 Follow step 1 through 9 in the Station Startup Procedure on the preceding page.
- Step 3 Go to the MAIN SCREEN MENU (SCREEN LIST SELECTOR SCREEN), then select the MANUAL FUNCTION SCREEN.
- Step 4 Press the CONVEYOR START, O.D. CLEANER START, COATER START and HIGH VOLTAGE START.
- Step 5 Use the High Voltage Adjust dial to change the high voltage setting or the coating (fluidic) bed. The Fluidic Bed air flowmeter may also be used to control powder fluidization.

KEEP IN MIND THE PRIORITY FUNCTIONS. The Air Knives, Roto-Flo Screw Vacuums, Coater, O.D. Cleaner and High Voltage can not turn "ON" unless the Powder Collector is "ON". The Induction Heater will not operate unless the Conveyor is "ON" and there are parts in the Induction Heater coil.

12.2.1 INDUCTION HEATER

To operate the Induction Heater, CONVEYOR START must be selected on the Manual Setup Screen. Then the IND HTR START must be selected on the Machine Startup Screen. The Induction Heater will be "ready", but will not generate heat unless the following conditions are met:

- Parts pass the Proximity Switch at the entrance to the Induction Coil.
- The Induction Heater hood is closed

The CURE INDUCTION HEATER power being generated is displayed on the MACHINE STATUS SCREEN.

NOTE:

If the Conveyor Clutch trips in Manual Mode, a message will be displayed which says "MAIN CONVEYOR DRIVE CLUTCH HAS TRIPPED" and the Conveyor will stop running. If this happens, the operator should turn the conveyor off and check for jammed parts or other problems which would prevent Conveyor operation. Then select the CONVEYOR START button to reset the Clutch. The Conveyor should begin to run.

12.3 AUTO MODE - COATING

The Auto Mode is intended to be used primarily under production line situations after all settings have been determined in Manual Mode.

- Step 1 Be sure all aspects of the Coating Machine operation are understood.
- Step 2 Follow step 1 through 9 in the Station Startup Procedure.
- Step 3 Go to the MAIN SCREEN MENU (SCREEN LIST SELECTOR SCREEN), then select the AUTO RUN SCREEN.
- Step 4 Press the AUTO RUN START screenbutton to start the machine.
- Step 5 The following buttons on the MACHINE STARTUP SCREEN should already have been selected in the order listed:
 - MACHINE SYSTEM START
 - CURE IND. HEAT START
 - SELECT AUTO MODE

NOTE:

If a problem occurs, a warning message will appear on the PanelView Screen and the buzzer will be turned on along with the lights of the Beacon Station. To correct any faults, it is not always necessary to shut the equipment down. But if it seems to be required, follow the STATION SHUT DOWN PROCEDURE (Section 12 in this manual) and correct the problem.

There is a Pyrometer that reads the temperature of the parts to check if they are at the correct operating temperature for cure (To Be Determine). In case the parts are not at the correct temperature, there will be an Alarm Status Screen message displayed on the Panel View Screen. If the temperature is shown as too low, the coating of the parts may not be fully cured. The operator should then use the following procedure to correct the problem:

- Increase the Induction Heater Power until the HEATED PARTS TEMPERATURE is reading at the proper level.
- Mark the parts whose coating may not be fully cured and set them aside for testing.

In case a fault occurs and the conveyor stops, leave parts in the Induction Heating Station. There will be automatic cycling of the Induction Heater, which will serve to complete the cure process. A message will come up IND HTR CYCLING.

13 STATION SHUTDOWN PROCEDURE

There are two modes for operating the Coating Machine; Automatic and Manual. This section will provide the operating personnel with a thorough understanding of the shut-down procedures.

13.1 AUTO MODE SHUTDOWN – COATING MACHINE

- Step 1 Run all parts off the System
- Step 2 On the AUTO RUN SCREEN, press AUTO RUN STOP or AUTO MODE OFF. This will turn off the Coater, High Voltage, Conveyor, and O.D. Cleaner. Once the Conveyor is "OFF", the Air Knives and Roto-Flo Screw Vacuums will cease to operate.
- Step 3 On the MACHINE STARTUP SCREEN, press MACHINE SYSTEM STOP. This will stop the Powder Collector, Powder Feeder, Induction Heater Water Pump, Final Cooling and Exhaust Blowers.
- Step 4 Once the Blower has shut off, press the Emergency Stop pushbutton. It is recommended that the daily cleaning procedure be performed

13.2 MANUAL MODE SHUTDOWN – COATING MACHINE

- Step 1 Run all parts off the System.
- Step 2 There is no required sequence for tuning "OFF" functions in the Manual (Setup) Mode. However, generally the functions would be shut "OFF" in reverse order of turning them ON.
- Step 4 Once the Blower has shut off, press the Emergency Stop pushbutton. It is recommended that the daily cleaning procedure be performed

NOTE: Do not press the Emergency Stop pushbutton until all the blowers have stopped

13.3 POWDER HANDLING AT SHUTDOWN

Only a minimum amount of powder should be left in the Powder Management System when it is shutdown over an 8 hour period. When the Machine is not used in excess of 24 hours, the powder should be removed from the Coating Bed in order to prevent clogging of the Porous Plate due to ambient temperature and humidity conditions. As most coating materials are hygroscopic, it is advisable that the powder be removed and stored in an airtight container. Storage of the powder for extended periods of time is not recommended.

When changing the type or color of powder, the Powder Management System must be thoroughly cleaned out in order to prevent contamination.

13.4 POWDER COLOR CHANGE



When changing powder from one color to another, it is very important that the Coating Bed and Powder Management System be thoroughly cleaned to prevent contamination. Also, the Powder Collector cartridge(s) should be changed if powder is being saved and reused.



13.5 LOCKOUT

SPECIFIC CHARACTERISTICS

Type of Energy	Place of Lockout	Method of Lockout and Releasing of Stored Energy	Checking the Result of Lockout
Electric 600V	E1 Main Electrical Enclosure	Place the Main Disconnect Switch in the "OFF" position. Place the multiple lock and a nametag on Main Disconnect Switch.	Make sure that the contacting surfaces are disconnected using gauge or by visual investigation. Try to restart the system. The system must not start!
Electric 600V	E2 Right side (facing) of the Induction Heater Control Cabinet	Place the Main Disconnect Switch in the "OFF" position. Place the multiple lock and a nametag on Main Disconnect Switch.	Make sure that the contacting surfaces are disconnected using gauge or by visual investigation. Try to turn on the Induction Heater Control cabinet. The system must not turn "ON"!
Pneumatic	P1 Main pneumatic valve Near the Air Drier.	Turn the valve handle 90 degrees clockwise. Make the lockout and place the multiple lock and a nametag on the Valve Disconnect Switch.	Listen to whether the valve has released the air. Make sure that the valve is closed and the lock is properly placed.
Water	W1	Turn the main water valve into the OFF position and place a lock and tag on it.	See that the valve has released water out of the valve drain and that the lock is properly placed.

14 **MAINTENANCE**

14.1 **GENERAL**

A systematic maintenance schedule should be set up and adhered to in order to insure optimum machine operation. Daily, weekly, and monthly schedules should be established as applicable for each part of the coating system.



WARNING: ELECTRICAL VOLTAGE USED IN THIS EQUIPMENT CAN BE HAZARDOUS. MAINTENANCE SHOULD BE HANDLED BY QUALIFIED PERSONNEL.

14.2 **COMPRESSED AIR SYSTEM**

The importance of keeping the compressed air clean, dry and oil free cannot be over-emphasized. More coating problems can be traced to failure to maintain the air filters and air dryers than any other cause.

14.2.1 **Air Line**

The airline which enters the coater should be kept clean and free of all particles, water and oil.

14.2.2 **Refrigerant Air Dryer**

Check the auto-drain for proper functioning. **NOTE:** The drain can become clogged by oil or dirt. This will allow wet compressed air to enter the machine, resulting in a clogged Porous Plate in the Coater and dirty, epoxy spotted parts. Refer to the manufacturer's information section for more specific maintenance instructions.

Particle Filter	Clean and check for proper functioning. Change filter element if dirty.
Coalescing Filter	Check and drain if necessary. Note: a wet filter element is normal. Refer to the Appendix of this Manual. Change the filter element if dirty. See the Spare Parts List for the correct filter number.

14.3 FLUIDIC BED

The porous plate is the key factor in controlling the powder cloud in the fluidic bed. Under normal operation, the powder on the plate will be uniformly fluidized (lightly bubbling) over the entire surface of the plate. If the fluidization is not uniform, the porous plate has become clogged and will have to be replaced. The porous plate will require periodic replacement depending upon hours of use, contaminants in the compressed air, and conditions of operation and cleaning.



CAUTION: THE UNIFORM POROSITY OF THE PLATE IS VERY IMPORTANT FOR PROPER COATING. DO NOT SCRAPE OR EVEN TOUCH IT WITH A HARD OR SHARP OBJECT. NEVER POINT AN AIR GUN DIRECTLY AT THE PLATE.

Clogging of the pores of the plate is the most common cause of failure. Once the porous plate has been removed, inspect it to determine the reason for clogging:

- Leaving powder unused in the bed for an extended period of time during humid conditions.
- Oil or water in air supply system.
- Damage from scratching, gouging or denting the plate.
- Blowing compressed air directly at the surface of the plate.

Correct the cause of plate failure and avoid conditions in the future which may lead to it. Order a new porous plate and gasket material from E.T.I. and carefully install.

14.3.1 Installation of Porous Plate

- Step 1 - Turn machine "OFF" and make sure Main Disconnect (located on Main Control Panel) is "OFF".
- Step 2 - Open the Hood of the Coater.
- Step 3 - Vacuum all the powder out from the Coater area. Use a soft brush or a soft plastic fitting on the end of the vacuum hose.

14.3.1 INSTALLATION OF POROUS PLATE (continued)



NOTE: Care must be taken when working around the Level Sensor so that the probe is not bent or damaged. Damage to a probe may cause the Level Sensor to cease functioning or to function improperly.

- Step 4 - Loosen the Vibrator mounting nut and remove the Vibrator.
- Step 5 - Remove the front panel of the machine (located at Coating Module).
- Step 6 - Disconnect the High Voltage cable and inlet AirLine from the Coater Ionization Chamber.
- Step 7 - Place a rigid support under the Coater Ionization Chamber (lower section of Coater).
- Step 8 - Loosen the plastic hex head screws located around the flange of Coater Ionization Chamber. Remove the plastic screws and let the Ionization Chamber rest on the rigid support.
- Step 9 - The old porous plate and gasket can now be removed by hand. NOTE: Clean any powder out of the charging media if required. Note that the bolts securing the Ionization Chamber to the Coater bed may not have been tightened enough or the gasket was worn or not seated properly if there is powder in the charging media.
- Step 10 - Place the new porous plate and gasket in the Ionization Chamber.
- Step 11 - Reverse steps #1 through #10 to re-install the Coater Ionization Chamber and operate the Coater.

14.3.2 Powder Level Sensor

Make sure that powder is not packed inside the probe tube or it will affect accurate sensing. Refer to the Photohelic Gauge information included in the Manufacturer's Manual binder for specific maintenance information on this unit.

14.4 POWDER COLLECTOR

Refer to Manufacturer's Manual binder for maintenance information on the Powder Collector, and Scrap Powder Collector.

14.4.1 Filter Cartridges

Under normal operation, the filter cartridges should be replaced approximately every 12 months. When circumstances require that they be changed, care must be taken to ensure proper air sealing is maintained. Care must also be taken to avoid damaging the Filter Cartridges, they are easily dented which may result in improper operation.

Refer to the manufacturer's instructions in the Manufacturer's Manual binder for the recommended Filter Cartridge (Element) removal and installation procedure.

14.4.2 Differential Pressure Gauge

The Powder Collector Filter Cartridge cleaning is done automatically by the unit. At the end of every shift the Differential Pressure Gauge (Magnahelic Gauge) should be checked to make sure that it is not reading above 4, which would indicate that the cartridges are not being cleaned. If the reading is above 4, then the pulse frequency (duration) should be increased. To increase the pulse frequency, decrease the setting on the "OFF TIME" timer which is located inside the electrical compartment of the Powder Collector. Note that the "ON TIME" timer has been factory set at the Manufacturer's factory for a minimum pulse cycle time and **SHOULD NOT BE CHANGED** without consulting the manufacturer.

The intensity of the pulse may be increased or decreased by raising or lowering the air pressure to the air pulse in the Powder Collector using the Air Regulator which is located on the side of the Powder Collector. A typical air pressure reading is 60 psi.

Refer to the Torit section in the Manufacturer's Manual binder for information on the "pulse frequency" and "pulse cycle". Also refer to the Manufacturer's Manual binder for information on the Differential Pressure Gauge.

14.5 INDUCTION HEATER

Observe the Water Tank Site Glass (located on the front of the Induction Degrease Station Panel) to make sure the deionized water level is correct.

Observe the Deionizer Indicator Light (located behind the Induction Degrease Station Panel) to make sure the deionized water in the Induction Heater cooling system is within specifications. If the Indicator Light is green, this means the filter element is good. Red means the filter element must be changed. **Note:** If the pump is not running, the light will always be red.

For the Manufacturer's recommended Maintenance Schedule, please refer to the Induction Heater section in the Manufacturer's Manuals binder.

14.6 O.D. CLEANER

The O.D. Cleaner Belt and Belt Cleaning Brush may become worn with time and need replacing. Refer to the Spare Parts List in this Manual for the correct part numbers

14.7 COOLING BLOWERS

Refer to the Manufacturer's Manual binder for specific maintenance information.

14.8 ROTO-FLO CONVEYOR

Vacuum out any accumulated powder.

14.9 MOTORS AND GEARS

Oil and lubricate as required. Refer to the Manufacturer's Manuals binder.



CAUTION: DO NOT GREASE OR OIL CONVEYOR. Roto-Flo Screws and components must be kept completely clean and dry in order to keep production parts clean.

15 PREVENTATIVE MAINTENANCE SCHEDULE

15.1 DAILY

1. Look over entire Conveyor system and remove any powder or foreign objects.
2. Check the site glass for the Induction Heater De-Ionized Water Tank level (look through the hole in the front panel at the Induction Degrease Station). Note that the Induction Heater Pump must be running in order to get a proper reading on the Indicator Light. (If the Pump is not running, the Indicator Light will always be red.) If the light is red, the filter cartridge must be changed. Green indicates the filter cartridge is okay. Refer to the Barnstead Section in the Manufacturer's Manual binder for information on replacing the filter cartridge. The panel on front of the Machine at the Cure Module must be removed in order to have access to the De-Ionizer Filter.
3. Check the Air Particle and Coalescing Filter Indicator Lens and replace the Filter Elements if required. Note: green – O.K., red – replace.
4. Check the automatic drain on the Refrigerant Air Dryer for proper discharging.

15.2 WEEKLY

1. Check and lubricate all motors, pumps, and bearings on the machine if required.
2. Check the Porous Plate for proper fluidization and replace if required. The Porous Plate should be replaced every 6 months, unless required earlier. Refer to Section 14.3.1 for instructions on replacing a Porous Plate.
3. Check the cooling water system for any restrictions which could cause a clog in the pump or other component.

15.3 MISCELLANEOUS

1. Under favorable conditions the Powder Collector Filter Cartridges should only need to be replaced approximately every 12 months. However, if the reading on the Differential Pressure Gauge (located on the Powder Collector) can not be brought down below 4 by adjusting the air pressure in the timer, then the Filter Cartridges need replacement.
2. It is recommended to replace the De-Ionizer Filter Cartridge approximately every 5 to 6 months, even if the De-Ionizer Filter Indicator Light is still green.
3. Powder should not be allowed to remain in the Coating Bed when the system is not in use. It should be removed to prevent clogging of the Porous Plate. As most coating materials are hygroscopic, storage of powder in the Powder Feeder and Powder Management System is also not recommended. Refer to Sections 11.2.2 and 13.3 of this Manual for Powder Handling information.
4. Check all belts monthly for wear, and replace if required.
5. Check O.D. Belt and Flapper/Wipers daily for wear and replace if required.

Note: The O.D. Cleaner Belt should be changed every 6 months unless indication of wear requires replacement earlier.

6. Check the Induction Heater air filter for cleanliness. Replace as required.

LUBRICATION CHART

LOCATION	MACHINE COMPONENT TO BE SERVICED	LUBRICATION COMPONENT TO BE SERVICED	NUMBER OF LUBRICATION COMPONENTS	LUBE FREQUENCY	RECM'D OIL OR GREASE
Load Station	Drive Motor	Gearbox	1	Check/Refill Monthly	SAE #90 Oil
Load Station	Pillow Block	Bearing	6	Yearly	Multi-purpose grease
Load Station	Right Angle Drive	Bearing	2	Quarterly	Multi-purpose grease
Load Station	Tensioner	Bearing	1	Quarterly	Multi-purpose grease

16 **PART CHANGEOVER**

The Jig (dummy shaft) compensates for stack height change between the Lamination Stacks to be run on this System.

The rear side Jig spacing remains the same with respect to the Roto-Flo™ Conveyor regardless of Lamination Stack height. The dimensional change of the stack regarding positioning on the Roto-Flo™ Conveyor would only occur on the front side of the stack.

Therefore the major machine adjustments for changeover between parts would be:

1. positioning of the Air Knives used to remove powder from the Jigs (especially in the Induction Heater where the Air Knives are used to prevent cured powder flashing at the Jig/Face Lamination interface)
2. positioning of the O.D. Cleaning Belt in the center of the lamination stack.

16.1 **CHANGEOVER PROCEDURE**

Air Knives

Loosen the locking clamps of the air knives, slide the air knives to required position (either A, B, or C), then tighten the locking clamps.

The angle of the Induction Heater Air Knives must be changed for each; to the point where the air stream blows powder off the jig without disturbing powder on the face lamination of the part.

O.D. Cleaner

The positioning of the O.D. Cleaner must be adjusted for the different parts. Center the O.D. Belt on the center of the lamination stack

16.2 **MACHINE SETTINGS**

Operator should note optimum machine settings for each of the parts and set the machine to those operating parameters when changing back to a different part. Kilovolt setting can only be changed in the Manual Mode. The Induction Heat Setting can be changed in the Auto Mode by turning the Pot.

INITIAL MACHINE SETTINGS

Part A (P/N X24015256, small part – 33 mm) - kV is 70 to 75, Induction Pot. is 800 to 820

Part B (P/N X24015262, medium part – 43 mm) - kV is 70 to 75, Induction Pot. is 700 to 720

Part C (P/N X24015301, large part – 54 mm) - kV is 70 to 75, Induction Pot. is 700 to 720

17 TROUBLESHOOTING**17.1 COATER**

COATER SYMPTOM	POSSIBLE CAUSE(S)	REMEDY(S)
No High Voltage to Coating Bed.	Coating Bed High Voltage turned "OFF"	Press High Voltage pushbutton "ON"
	Coating Bed High Voltage control set too low.	Increase (turn knob) High Voltage control.
	Overload tripped.	Press High Voltage Overload reset button.
	High Voltage Cable loose in Power Supply.	Tighten the connector at the High Voltage Power Supply.
	High Voltage Cable length in Power Supply is too short.	Remove connector from cable and reinstall so that more unshielded cable protrudes beyond the connector.
Kilovolt Meter indicates High Voltage has decreased. (Every time High Voltage is applied (press pushbutton), the High Voltage reading drops in approx. 20 kV increments).	High Voltage Power Supply is bad.	Remove the High Voltage Cable from the High Voltage Power Supply (cable with the chromed, knurled connector). Replace the High Voltage Power Supply.
Low Voltage (50 kV max) and High Microamps to Coating Bed (Microamps increase above normal range).	Possible ground source down in Coating Bed such as: parts off conveyor; metallic contaminants; or coating powder is wet or damp.	Refer to " <u>Coating powder is wet or damp</u> " symptom.
	High Voltage Power Supply Cable may be defective.	Replace cable.
Low/No Microamps and Low/No Kilovolts supply to Coating Bed.	High Voltage Power Supply is bad.	Replace the High Voltage Power Supply.
	High Voltage Adjust (Variac) is bad.	Have a qualified electrician check the output of the Variac (output should read up to 110 VAC)

17.1 COATER (continued)

Low Kilovolts (approx. 2 kV) and High Microamps.	High Voltage cable may be defective.	Remove the High Voltage cable from the High Voltage Power Supply (this is the cable with the chromed, knurled connector).
Insufficient air to fluidize powder.	Air flowmeter control is set too low.	Increase airflow (turn knob) on flowmeter.
	Air leaking by gasket at porous plate.	Tighten screws of porous plate ring.
		Check gasket – replace if necessary.
	Porous Plate is clogged.	Install new porous plate.
	Air solenoid not operating.	Replace defective solenoid.
	Particle Air filter is clogged.	Replace filter element.
	Air shut-off valve partially closed.	Check valve and open if required.
Ice blocking airlines.	Repair or adjust Air Dryer (refer to manufacturer's maintenance information)	
Coating powder is wet or damp.	Moisture in Coater fluidizing air.	Check analysis gauge on the Air Dryer.
		Check the auto-drain (refer to manufacturer's maintenance information)
	Refrigerant Air Dryer malfunctioning.	Refer to the manufacturer's maintenance information of this manual.
	Particle Air Filter is dirty.	Replace the filter element. Refer to the Spare Parts List of this manual for part number.

17.1 COATER (continued)

Coating powder is wet or damp. (continued)	Coalescing Filter needs to be drained.	Drain Coalescing Filter and replace the filter element if damaged. Refer to the Spare Parts List of this manual for part number.
	Powder is <u>hygroscopic</u> and has absorbed moisture from the humid air around it.	Aerate powder in Coating Bed at low fluidization air setting for 20 minutes with High Voltage turned "OFF"
Substrate not properly grounded.	Faulty ground to substrate.	Check ground clip to substrate to make sure it is secure or insure that the conveyor or tooling provides a good ground.
Coater Unit in overload condition.	Coater High Voltage overload circuit is factory set to trip (shut coater off) at conservative value. Customer's application may require a higher trip point.	Consult ETI for recommendation and instruction.
	Damp powder in Coating Bed.	Remove damp powder, vacuum any remaining powder, wipe inside walls of Coating Bed. Load Coating Bed w/dry powder. Check reason for damp powder and correct cause.
	Fluidizing air is wet.	Refer to " <u>Coating powder wet or damp</u> " symptom.
	Foreign metallic material in Coating Bed.	Remove foreign metallic material.
	Operation of Coater High Voltage near maximum output.	Reduce Coater High Voltage and correct problem which requires operation near maximum output.

17.1 COATER (continued)

<p>Coater Unit in overload condition. (continued)</p>	<p>Coater High Voltage cable may have shorted out.</p>	<p>Remove cable from Coater High Voltage supply. Turn "ON" High Voltage and increase kV to maximum. If overload does not occur, the High Voltage cable may be bad and need to be replaced. Contact ETI to order a replacement High Voltage cable (P/N 5061012). If unit still overloads after replacing High Voltage cable, this may indicate a crack in the Coating Bed or a high voltage leak. Contact ETI personnel at once for instructions. Do not attempt to repair cracks in Coating Bed, as plastic fabrication expertise and equipment is required for repair.</p>
	<p>High Voltage Power Supply may be defective.</p>	<p>Remove High Voltage cable from High Voltage Power Supply. Turn "ON" High Voltage and increase kV to maximum. If Coater still overloads, and a noise is heard from inside the power supply, the power supply may be defective. It should be removed and returned to ETI for evaluation and repair.</p>

17.2 POWDER COLLECTOR

COLLECTOR - SYMPTOM	POSSIBLE CAUSE(S)	REMEDY(S)
No suction on Powder Collector.	Plastic film cover on blow-out panel is leaking air – hole in plastic film cover.	Replace the plastic film. Material: Mylar; Thickness: 0.005 in. (0.127 mm).
	Powder Collector filter cartridges not being cleaned – infrequent filter cartridge blow-off.	Increase sequence time to blow-off filter cartridges more often. (Torit models SDF only). Refer to the Powder Collector manufacturer's manual.
	Powder Collector filter cartridges not being cleaned – air pressure to cartridge blow-off filter is set too low.	Check differential pressure gauge. Note: gauge should read between 1" to 4" H ₂ O. If required, increase the air pressure to blow-off by adjusting the air pressure regulator located on the side of the Powder Collector.
	Powder Collector Filter Cartridges worn out or permanently clogged.	Replace with new Filter Cartridges. Contact E.T.I. for proper replacement Filter Cartridge part number.

17.3 CONVEYOR CLUTCH

MAIN CONVEYOR CLUTCH IS TRIPPED	POSSIBLE CAUSE(S)	REMEDY(S)
	The conveyor clutch (torque limiter) tripped. Part jammed in Roto-Flo bearing.	Check the entire length of the Roto-Flo conveyor for any jams or pinching. Correct any jams or pinch points.
	A Roto-Flo conveyor bearing is binding on the conveyor causing excessive torque.	Local Mode: Let the conveyor drive system continue to run until the Roto-Flo clutch resets itself.

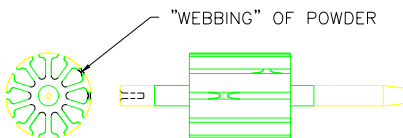
	The conveyor clutch limit switch is out of proper alignment with clutch.	Check the operation of the Roto-Flo clutch trip switch. The limit switch should go off when the clutch is tripped.
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17.4 BAD PARTS

BAD PART – SYMPTOM	POSSIBLE CAUSES	REMEDY(S)
Powder coating too thin.	Low powder level in Coating Bed.	Check height of Level Sensor Tube (probe) and adjust if necessary. Refer to section 11.3.2.2 for adjustment instructions.
	Low powder in Powder Collector which is starving the Coating Bed.	Add powder to the Powder Collector.
	High Voltage setting is too low.	Adjust (turn knob) the High Voltage control, located on the Operator Main Control Panel.
Powder coating is too heavy.	Excess high voltage applied to the Coating Bed.	Adjust (turn knob) the High Voltage control, located on the Operator Main Control Panel.
	High powder level in Coating Bed.	Check height of Level Sensor Tube (probe) and adjust if necessary. Refer to section 11.3.2.2 for adjustment instructions.
Powder remains on part O.D.	O.D. Cleaner Belt is incorrectly adjusted.	Adjust the O.D. Cleaner Belt. Refer to Section 7.3.2 for adjustment instructions.
	O.D. Cleaner Belt is worn.	Order a new O.D. Cleaner Belt.
	O.D. Flapper/Wipers are incorrectly adjusted.	Properly adjust O.D. Flapper/Wipers.
	O.D. Flapper/Wiper Pads are worn.	Replace O.D. Flapper/Wiper Pads.
	Parts not clean prior to coating; oil residue remains after exiting the Degreasing station.	Check degreasing operation.
	Parts not cooled enough after exiting the Pre-Cool station.	Check pre-cooling operation.

17.4 BAD PARTS (continued)

BAD PART – SYMPTOM	POSSIBLE CAUSE(S)	REMEDY(S)
Ridge of powder (flashing) at Jig/Face Lamination junction	Air Knives incorrectly adjusted.	Check Air Knives and adjust as required.
	Incorrect amount of air supplied to Air Knives.	Check and adjust each Air Knife air flowmeter to supply the correct amount of airflow. The correct values should be logged for future use.
Powder coating not cured.	Induction Heater not supplying enough power to the Induction Station Coil to heat parts to proper temperature.	Adjust the Induction Heater temperature setting, located on the Operator Main Control Panel.
		Refer to the Manufacturer's Manual for possible reasons why the unit is not operating properly.
Bubbles appear in powder coating.	Parts are not clean enough; oil residue remains after degreasing.	Check the degreasing operation.
Powder "webbing" between slot openings at pole tips of parts.	O.D. Cleaner Belt adjusted incorrectly.	Adjust O.D. Cleaner Belt. Rotating belt should just barely touch O.D.'s of parts.
	O.D. Cleaner Belt not being properly cleaned.	Adjust O.D. Cleaner air regulator to increase the vacuum suction on the belt as it rotates.
	O.D. Cleaner Belt worn (if applicable).	Order a new O.D. Cleaner Belt from ETI and replace (if applicable).
	O.D. Flapper/Wipers are incorrectly adjusted.	Properly adjust O.D. Flapper/Wipers.
	O.D. Flapper/Wiper Pads are worn.	Replace O.D. Flapper/Wiper Pads.
	Excess powder coating thickness on part.	Check Coating Bed fluidizing air settings.
		Check powder level inside Coating Bed.



18 PATENT INFORMATION

The Model 800 Armature Coating System is manufactured under one or more of the following United States Patents:

5,773,097	
5,275,849	5,639,307
5,213,847	4,101,687
5,116,636	4,084,018
5,092,267	4,053,661
5,052,332	4,030,446
4,606,928	3,951,099
4,517,219	3,937,179
4,472,452	3,921,574
4,418,642	3,916,826
4,368,214	3,917,461
4,332,835	3,901,185
4,330,567	3,889,015
4,325,982	3,881,763
4,297,386	3,865,610
4,123,175	3,828,729
4,120,070	3,698,847

19 SPARE PARTS LIST

PART DESCRIPTION	ETI PART NO.	ASSEMBLY	QTY.	RECM'D SPARE	PRICE EACH
Porous Plate	101266	Fluidic Bed Assy.	1	2	\$218
Gasket Material, ½ wide x 1/8 thick		"	A/R	1 roll	\$50
Nylon Screws, 5/16-18 x 1½" long , Hex Head		"	23	46	\$.75
Powder Level Sensor, Photohelic Pressure Switch	3018015	"	1	-	-
Level Sensor Tube (Probe)	101335	"	1	-	-
High Voltage Power Supply 80 kV DC, 200 µAmp	5050010	"	1	1	\$2,850
High Voltage Cable	5061012	"	1	1	\$145
Banana Plug	5017001	"	1	-	-
Vibrator, Magnetic, 115 V, 60 Hz. Syntron #V-4RC	5041002	"	1	-	-
Fire Detector Limit Switch Allen-Bradley #802T-A		"	1	-	-
Monofilament Line, #10 Test		"	5 ft.	A/R	-
Air Knife, 3" long	101068	Air Knife Box Assy.	8	2	\$571
Flapper/Wiper Pad Assembly	B101357	"	3	3	\$125
Brush, 3½" long Sealeze #SFB-105-BL		"	4	4	\$54
O.D. Cleaner Motor, 1/17 H.P., 83 RPM, 130 VDC Bodine #24A4BEPD-D3		O.D. Cleaning Station	1	-	-
Slide Rework	100645	"	1	-	-
Endless Belt	102476	"	1	1	\$107
Material Transfer Vaccon #DF5-6		"	1	-	-
Coil Wound Brush (2 3/8" long)	7000007	"	1	1	\$60
Ball Bearing Berg #B11-9		"	2	-	-
Bearing Nice #1616DCTN		"	2	-	-
Drive Pulley	101172	"	1	-	-
Driven Pulley	101173	"	1	-	-
Air Knife, 3" long	101068	"	2	-	-
Air Knife, 6" long	101362	"	4	2	\$634
Induction Coil Support Top	101345	Induction Station	2	-	-
Induction Coil Support Bottom	101346	"	1	-	-
Induction Coil Bracket Top	101347	"	2	-	-
Induction Coil Bracket Support	101352	"	2	-	-

PART DESCRIPTION	ETI PART NO.	ASSEMBLY	QTY.	RECM'D SPARE	PRICE EACH
I.R. Temperature Sensing Head, 10:1 Optics Raytek #MI100CB10		Induction Station	1	-	-
I.R. Sensing Head Air Purge Jacket Raytek #MIACAJ		"	1	-	-
Air Knife, Induction	101830	"	2	2	\$571
Induction Heating Coil Assembly	101353	"	1	-	-
Hose, PVC ½	54075K45	"	A/R	A/R	-
Induction Heater, 40 kW, 50 kHz Pillar #MK12 (Ser. No. 2621)		"	1	-	-
For a complete list of Pillar Spares, see Pillar Section in the Manufacturer's Manuals					
Heat Exchanger, Type BCF, ITT Standard #5-030-04-036-006		Heat Exchanger.	1	-	-
Temperature Control Allen-Bradley #837-A3A		"	1	-	-
Deionizer, Barnstead – consisting of:		Heat Exchanger Assy.			
Single Cartridge Holder, Barnstead #D4511		"	1	-	-
Pura-Lite Indicator, Barnstead #E3450		"	1	-	-
Replacement Filter Cartridge, Barnstead #D0803		"	1	2	\$154
Pump Eastern Centrichem #ECH2-ASA-FE-YSS		"	1	-	-
Pump Motor, 3 H.P., 3450 RPM, 460 V, 60 Hz., 3-Phase Baldor #VM3559T		"	1	-	-
Check Valve, 1" NPT McMaster #4708K55		"	1	-	-
Y-Strainer, 1" NPT McMaster #43935K15		"	1	-	-
Ball Valve, 1½" NPT McMaster #47865K27		"	1	-	-
Liquid Level Gauge, ½" NPT McMaster #1104K8		"	1	-	-
Solenoid Valve, 24 VDC Coil ASCO #8316G64		"	1	-	-
Hose, PVC 1½ I.D. McMaster #52375K19		"	1	1	\$6/ft.
Tubular Heater, 1000 W, 240 V Watlow #RCN3010S		Cure Module	1	1	\$90
Temperature Control Allen-Bradley #837-A4A		"	1	-	-

PART DESCRIPTION	ETI PART NO.	ASSEMBLY	QTY.	RECM'D SPARE	PRICE EACH
Blower, Arr. 4, CW Rotation., Up-blast, 10 5/8 Dia. x 2 7/8 Wheel & Inlet Guard, Cincinnati #PB-9 (w/ Motor; 1 H.P., 56C Frame, 3450 RPM, 230/460 V, 60 Hz., 3-Phase Baldor #CM3545)		Final Cool	2	-	-
Waste Powder Collector, 1 H.P. Torit #VS-550		Waste Powder	1	-	-
Waste Powder Collector Blower Motor, 1 H.P., 3450 RPM, 460 V, 60 Hz., 3-Phase Baldor # VM3545		"	1	-	-
Replacement Filter Cartridge for Torit VS-550 Torit #24740-00		"	1	1	\$385
Powder Collector (Modified) Torit # TD-486		Powder Management System – Collector	1	-	-
Powder Collector Filter Element Torit # 8PP21586-00 (Ultra Web)		"	9	9	\$89
Timer Board National Controls #DNC-T2010-A10		"	1	-	-
Blower, Arr. 1, CW Rotation., Up-blast Cincinnati #RBE-7		Powder Management System – Blower	1	-	-
Collector Blower Motor, 3 H.P., 1725 RPM Baldor #M3611		"	1	-	-
V-Belt Browning #A73		"	1	1	\$21
Rotary Air Lock Motor, ¼ H.P., 1140 RPM, 56C-Frame Baldor #VM3531		Powder Management System – Hopper	1	-	-
Powder Feed Motor, ½ H.P., 1140 RPM, 56C-Frame Baldor #VM3539		"	1	-	-
Powder Feeder Spiral for Flexicon Model 1200 Powder Feeder, 12 ft. Long		"	1	1	\$703
Powder Feeder Outer Tube for Flexicon Model 1200 Powder Feeder, 10 ft. Long, 2.25" O.D.		"	1	1	\$563
Reducer, 60:1 Ratio, Style C, 56 C Hub City #MOD 214		"	1	-	-
Reducer, 15:1 Ratio, Style R, 2" Bore Hub City #326		"	1	-	-
Rotary Air Lock Meyer #4x4		"	1	-	-
Rubber Gloves, Size 10	7000008	"	1 pr	1 pr	\$169
Oil Seal	7000003	"	1	-	-

PART DESCRIPTION	ETI PART NO.	ASSEMBLY	QTY.	RECM'D SPARE	PRICE EACH
Hopper Level Sensor	7200010	"	1	-	-
Differential Pressure Switch, 2"-5" H ₂ O Dwyer #1823-5		Powder Management System – Hopper	1	-	-
Differential Pressure Gauge Dwyer #2008		"	1	-	-
Sight Gauge, ½ NPT, 4 1/32 Oil-Rite #B2574		"	1	-	-
Sight Gauge, ¼ NPT, 3 1/32 Oil-Rite #B1357		"	1	-	-
Gauge, 0-100 psi Marshalltown #G10126		"	1	-	-
Regulator Master Pneumatic #R100-4		"	2	-	-
Flourescent Tube Sylvania #F1558-CW	5013006	"	1	-	-
Refrigerant Air Dryer, 100 scfm, 115 V, 60 Hz., 1-Phase Ultrafilter #SD0175A		Pneumatic	1	-	-
Air Filter Housings Ultrafilter #AG0018		"	2	-	-
Particle Filter Replacement Element Ultrafilter #PE-05/20		"	-	1	\$142
Coalescing Filter Replacement Element Ultrafilter #MF-05/20		"	-	1	\$149
Solenoid Valve, 24 VDC, ¾ NPT, DIN Connector SMC #NVS-3145		"	1	-	-
Air Regulator Master Pneumatic #R180-8P		"	1	-	-
Air Regulator Master Pneumatic #R100-4P		"	2	-	-
Air Regulator Master Pneumatic #R100-3P		"	1	-	-
Air Regulator Master Pneumatic #R100-2P		"	1	-	-
Air Pressure Gauge Marsh #J2448		"	4	-	-
Air Flowmeter Dwyer #RMC107-BV		"	1	-	-
Air Flowmeter Dwyer #RMB54-BV		"	8	-	-
Air Flowmeter Dwyer #RMB55-BV		"	4	-	-
Air Flowmeter Dwyer #RMA10-BV		"	1	-	-
Solenoid Valve, 24 VDC, DIN Connector SMC #SY7140-5DZ-03T-3145		"	3	-	-

PART DESCRIPTION	ETI PART NO.	ASSEMBLY	QTY.	RECM'D SPARE	PRICE EACH
Solenoid Valve, Jig Press & Removal, 24 VDC, DIN Connector SMC #SY7140-5DZ-02T		Pneumatic	2	-	-
Air Regulator (Norgren)	3013004	"	2	-	-
Air Pressure Gauge (Norgren)	3013005	"	2	-	-
Ram	102113	Jig Press	6	-	-
Air Cylinder Bimba #FO-09-1.5-3R		"	6	2	\$109
Air Cylinder Bimba #FO-31-0.5-3R		Jig Separator	2	1	\$143
Roto-Flo Screw, L.H., (Drive)	101288	Conveyor	2	2	\$895
Roto-Flo Screw, L.H.	101289	"	6	6	\$1,710
Roto-Flo Screw, L.H., Fiberglass (Induction)	101290	"	2	2	\$1,172
Roto-Flo Screw, L.H., (Exit)	101291	"	2	2	\$862
Screw Splice Pin	101292	"	8	8	\$90
Pin, Induction	101293	"	4	4	\$95
Bearing Block	101294	"	28	-	-
Bearing Block, Induction	101295	"	6	2	\$587
Guide Rail, Entrance	101296	"	1	-	-
Guide Rail, Coating/Induction	101297	"	1	-	-
Guide Rail, Induction/Cure	101298	"	1	-	-
Guide Rail, Cure/Cooling	101299	"	1	-	-
Guide Rail, Exit	101300	"	1	-	-
Roto-Flo Bearing	100270	"	34	34	\$160
Roto-Flo Screw, L.H., Dual Pitch (Coating)	102324	"	2	2	\$2086
Sprocket, 1" Bore w/ keyway & set screw Martin #40BS20		Drive	1	-	-
Sprocket, ¾" Bore w/ keyway & set screw Martin #40BS16		"	2	-	-
Sprocket, 1" Bore w/ keyway & set screw Martin #40BS16		"	1	-	-
Pillow Block Sealmaster #RPL-16		"	2	-	-
Pillow Block Sealmaster #RPL-12		"	4	-	-
Limit Switch Mayr #055.000.5		"	1	1	\$287
Roller Chain w/ 2- Connecting Links Browning #40		"	10 ft.	-	-
Clutch, OPTI Torque, Size 1 Mayr #462.645.0/.875"/.875"		"	1	1	\$1,203
Pillow Block Sealmaster #RP-16		"	2	-	-

Gear Reducer, Series 2100 Hub-City #2104-LA-R		"	1	-	-
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PART DESCRIPTION	ETI PART NO.	ASSEMBLY	QTY.	RECM'D SPARE	PRICE EACH
Drive Motor, Type 3320P, 1750 RPM, 56C Frame, 90 VDC Baldor #CDP3310		Drive	1	-	-
Drive Tightener Browning #ATQ		"	2	-	-
Idler Browning #HN40B19		"	2	-	-
Sprocket, 1" Bore w/ keyway & set screw Martin #40BS35		"	1	-	-
Ramp	101336	Off-Load Ramp	1	-	-
Brush, 4 ft. Long Sealeze #SFA110BL		"	2	2	\$61
Masking Jig Assembly, Front	102392	Jig Assy.- Front	400	-	-
Masking Jig Assembly, Rear	102393	Jig Assy. - Rear	400	-	-
Overload Relay Regent Control Resetter 32		Electrical	1	-	-
Pressure Switch, 18 mm, Unshielded Allen-Bradley #836T-T253J		"	1	-	-
Capacitive Sensor Efector #K13513		"	1	-	-
Proximity Switch, 18 mm, Unshielded Efector #IG0350		"	7	-	-
Power Supply, 24 Volt Power One #HE24-7.2-A		"	1	-	-
Operator Control Screen, Panelbuilder Type PV-550 Allen-Bradley #2711-T5ASL1		"	1	-	-
PanelView Back Light Lamp Allen-Bradley #2711-NL1		"	1	1	\$126
Contactors Allen-Bradley #100-A12ND3		"	1	-	-
Contactors, 24 Volt DC Allen-Bradley #100-A09NZ243		"	8	-	-
Contactors, 24 Volt DC Allen-Bradley #100-A12NZ243		"	1	-	-
Surge Suppressor, DC Diode Allen-Bradley #199-MSMD1		"	6	-	-
Surge Suppressor Allen-Bradley #199-FSMA1		"	1	-	-
Surge Suppressor Allen-Bradley #199-MSMA1		"	1	-	-
Surge Suppressor, DC Diode Allen-Bradley #199-FSMZ		"	9	-	-

Mini-Control Relay, 110 Volt AC Allen-Bradley #700DC-M400A1		"	1	-	-
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PART DESCRIPTION	ETI PART NO.	ASSEMBLY	QTY.	RECM'D SPARE	PRICE EACH
Mini-Control Relay, 24 Volt DC Allen-Bradley #700DC-M400Z24		Electrical	4	-	-
Mini-Control Relay, 24 Volt DC Allen-Bradley #700DC-M220Z24		"	2	-	-
Transformer, 115V, 60 Hz. Primary/12V, 1.2 Amp Secondary	5062005	"	1	-	-
Transformer, 2 KVA, 460V/120V Acme #T-2-53012-S		"	1	-	-
Constant Voltage Transformer Sola #23-23-210-8		"	1	-	-
D.C. Motor Speed Control KB/Penta Power #KBMM-125		"	2	-	-
Sound Module Allen-Bradley #855T-B24SA1		"	1	-	-
Incandescent Bulb Allen-Bradley #855T-L24		"	4	4	\$5
Circuit Breaker, 15 Amp, 3 Pole Allen-Bradley #1492-CB3H150		"	1	-	-
Circuit Breaker, 7 Amp, 2 Pole Allen-Bradley #1492-CB2H070		"	1	-	-
Circuit Breaker, 4 Amp, 2 Pole Allen-Bradley #1492-CB2H040		"	1	-	-
Circuit Breaker, 10 Amp, 3 Pole Allen-Bradley #1492-CB3G100		"	1	-	-
Circuit Breaker, 1 Amp, 2 Pole Allen-Bradley #1492-CB2H010		"	1	-	-
Circuit Breaker, 5 Amp, 1 Pole Allen-Bradley #1492-GH050		"	1	-	-
Circuit Breaker, 0.5 Amp, 1 Pole Allen-Bradley #1492-GH005		"	1	-	-
Circuit Breaker, 15 Amp, 1 Pole Allen-Bradley #1492-CB1H150		"	1	-	-
Circuit Breaker, 10 Amp, 1 Pole Allen-Bradley #1492-LB1G100		"	2	-	-
Circuit Breaker, 2 Amp, 1 Pole Allen-Bradley #1492-GH020		"	2	-	-
Circuit Breaker, 7 Amp, 3 Pole Allen-Bradley #1492-GH070		"	2	-	-
Trip Indicator Auxiliary Contact Allen-Bradley #140-T01		"	1	-	-
Manual Motor Starter Allen-Bradley #140-MN-0630		"	1	-	-
Manual Motor Starter Allen-Bradley #140-MN-0100		"	1	-	-
Manual Motor Starter Allen-Bradley #140-MN-0160		"	1	-	-

Manual Motor Starter Allen-Bradley #140-MN-0250		"	4	-	-
Manual Motor Starter Allen-Bradley #140-MN-400		"	1	-	-
PART DESCRIPTION	ETI PART NO.	ASSEMBLY	QTY.	RECM'D SPARE	PRICE EACH
Fuse, 0.8 Amp Bussmann #MDL-0.8 (available only in 5 pack)		Electrical	7	2 pkg.	\$9/pkg
Fuse, 15 Amp Bussmann #LPJ-15SP		"	3	3	\$14
Fuse, 70 Amp Bussmann #LPJ-70SP		"	3	3	\$53
Processor, SLC-5/03 Allen-Bradley #1746-L531		Program. Controller	1	-	-
Sinking Input Module, 24 VDC Allen-Bradley #1746-IB16		"	3	-	-
Sourcing Output Module, 10-50 VDC Allen-Bradley #1746-OB16		"	2	-	-
Analog Input Module Allen-Bradley #1746-N14		"	1	-	-
Power Supply, 24 VDC Allen-Bradley #1746-P3		"	1	-	-

20 FLOOR PLAN

See Appendix for Floor Plan Layout Drawing #D-101413

21 PNEUMATIC SCHEMATIC

See Appendix for Pneumatic Schematic #D-101365

22 ELECTRICAL SCHEMATIC

See Appendix for Electrical Schematics

23 **MANUFACTURER'S MANUALS**

All of the Manufacturer's Manuals listed below can be found in the separate "Manufacturer's Manuals" binder:

- Air Filter Housings (Ultrafilter)
- Air Flowmeter (Dwyer)
- Blower (Cincinnati Fan)
- Blower Motor (Baldor)
- Clutch w/Limit Switch (Mayr)
- Current Sensing Relay ReSetter32 (Regent Controls)
- Differential Pressure Gauge (Dwyer)
- Discrete I/O Modules (Allen-Bradley)
- DC Motor Speed Control (KB/Penta Power)
- Deionizer Filter System (Barnstead)
- Gear Motor (Bodine)
- Gear Reducer (Hub City)
- Heat Exchanger (ITT)
- Heat Exchanger Pump (Eastern Centrichem)
- High Voltage Power Supply (Hipotronics)
- Induction Heater (Pillar)
- I.R. Temperature Sensing Head (Raytek)
- Low Differential Pressure Switch (Dwyer)
- PanelView 550 Touch Screen Terminal (Allen-Bradley)
- Powder Collector TD-486 (Torit)
- Powder Collector VS-550 (Torit)
- Powder Level Sensor - Photohelic (Dwyer)
- Power Supply (Power One)
- Pressure Regulator R-100 (Master Pneumatic)
- Pressure Regulator R-180 (Master Pneumatic)
- Proximity Sensor (Efector)
- Refrigerant Air Dryer (Ultrafilter)
- Rotary Air Lock (Meyer)
- SLC 500 Analog I/O Modules (Allen Bradley)
- Solenoid Valve 8016-G (ASCO)
- Solenoid Valve 8316 (ASCO)
- Sound Module – Horn (Allen-Bradley)
- Temperature Control (Allen-Bradley)
- Transformer (Acme)
- Transformer (Sola)
- Tubular Heater (Watlow)
- Vibrator (Syntron)