
	<i>DELTA EXTERIOR SYSTEMS (DEXSYS)</i>	<i>Document Code: ENV-36</i>
	<i>Procedure</i>	<i>Issue Date: 3/1/19</i>
	Malfunction Abatement Plan	<i>Approved by: Sean Guyett</i> Signature on file

MALFUNCTION ABATEMENT PLAN
FOR THE
EISENMANN RTO
CAPTURE AND CONTROL SYSTEM

DexSys
Lansing, Michigan

	<i>DELTA EXTERIOR SYSTEMS (DEXSYS)</i>	<i>Document Code: ENV-36</i>
	<i>Procedure</i>	<i>Issue Date: 3/1/19</i>
	Malfunction Abatement Plan	<i>Approved by: Sean Guyett</i> Signature on file

VALVELESS REGENERATIVE THERMAL OXIDIZER SYSTEM

DexSys is a Tier I supplier of automotive fascias for the automotive industry. Parts are formed through injection molding of plastic resins, painted a color to match the intended automotive body, and then assembled to meet OEM specifications.


The Eisenmann paint line is dedicated to applying primer, base, and clear coat applications to the plastic automotive parts. The paint line is a fully enclosed conveyORIZED paint line, consisting of a five stage wash system, dry-off oven, six fully automated paint spray booths (prime, base, clear), a Dewatering cure oven, a Radiant oven, and a final Convection cure oven. Each of the six booths is equipped with downdraft water wash particulate control system. The water is recirculated through an on-site Sludge / Palin system, designed to remove the particulate from the water.

The air flow into and out of the enclosed paint system is treated as a Non-Fugitive Enclosure (NFE). Air flow direction is such that all VOC containing air streams are directed inward, relative to the enclosure and collected for control. The exhaust from the six paint booths, Dewatering cure oven, Radiant oven, and final cure oven are collected in a common header and directed to a regenerative thermal oxidizer (Eisenmann RTO). The air flow from the booths is 90% recirculated, to allow for a more concentrated air stream being directed to RTO.

The enclosure is continuously monitored to confirm air flow direction. Pressure is monitored at the entrance of the adhesion promoter booth and at the end of the convection oven/beginning of cooling tunnel 3. The differential pressure between the entrance and the exit is used to verify that air is being directed inward. A data point is recorded and logged at each location every 15 minutes. The previous twelve 15 minute data points are averaged together to generate the 3 hours average. Both the 15 minute and 3 hour averages are made from data collected during paint operating time. Email notification will be sent to all pertinent employees at a minimum if the previous 15 minutes is above -0.007 inWc.

The Eisenmann 7.2 VRTO has a design air flow rating of 34,600 scfm, a thermal efficiency of 95% and a destruction efficiency of 95%.

The VRTO has a single, rotary distributor filled with 1 inch random-pack ceramic media. Inlet / outlet air plenums are located beneath the beds with a combustion / retention chamber located above the beds which connects the two media canisters. There is a single burner which maintains the retention chamber temperature and has a design retention time of 1.0 seconds.

	<i>DELTA EXTERIOR SYSTEMS (DEXSYS)</i>	<i>Document Code: ENV-36</i>
	<i>Procedure</i>	<i>Issue Date: 3/1/19</i>
	Malfunction Abatement Plan	<i>Approved by: Sean Guyett</i> Signature on file

The process air is directed through the first ceramic media bed where it uses the heat from the pre-heated bed to raise the exhaust gas temperature. Once the air leaves the first can it enters the combustion zone where a natural gas fired burner further elevates the process air to a temperature greater than 1500 °F where the VOCs are oxidized into carbon dioxide and water. The oxidized process air then flows out of the combustion zone and through the second ceramic media bed where the process air gives up its heat to the ceramic media prior to entering the outlet plenum on its way to the being discharged from the exhaust stack.


Table 1 presents the operational set points of the RTO.

Parameter	Units	Range / Setpoint
Combustion Chamber Temperature	° F	1500 – 1600
Bypass Valve position	Open/Closed	Closed
Booth Differential Pressure	inWc	< -0.007


The RTO is equipped with an operating computer system which monitors the above listed parameters as well as fan motor temperatures, fan bearing temperatures, rotor motor amperage, burner operation, and process air flow. If the process senses an exceedance of any of the operational parameters an alarm is triggered and the oxidizer and process shuts down automatically. There are monthly inspections to verify the operation of automatic line shutdown system in the event of an open bypass valve.

In the event of a shutdown of the RTO, the production process will automatically stop operation. This is accomplished with an inter-lock system on the application robots. The conveyor line will remain operating in order for the company to retrieve painted parts in the cure ovens.

The following table is a list of potential malfunctions and the planned response for each malfunction.

	<i>DELTA EXTERIOR SYSTEMS (DEXSYS)</i>	<i>Document Code: ENV-36</i>
	<i>Procedure</i>	<i>Issue Date: 6/17/15</i>
	Malfunction Abatement Plan	<i>Approved by: Sean Guyett</i> Signature on file

Parameter	Operating Variable	Monitoring Method	Responsibility	Corrective Procedure or Operational Change in the Event of a Malfunction
Combustion Zone Temperature	1,500 – 1,600 °F	Thermocouple	Maintenance Manager	If temperature is below 1500°F, coating operations shut down automatically – Maintenance staff will investigate and make repairs as necessary
Booth Differential Pressure	< -0.007	Pressure Sensors	Maintenance Manager	If the 3-hour average is >-0.007, coating operations shut down automatically – Maintenance staff will investigate and make repairs as necessary
Exhaust Fan Failure	Blower Running	Speed Feedback and Amperage Monitoring	Maintenance Manager	If exhaust fan fails, coating operations shut down automatically – Maintenance staff will investigate and make repairs as necessary
Bypass Valve	Closed Bypass Valve	Continuous Position Monitoring	Maintenance Manager	If bypass valve is opened, coating operations shut down automatically – Maintenance staff will investigate and take action as necessary


	DELTA EXTERIOR SYSTEMS (DEXSYS)	Document Code: ENV-36
	<i>Procedure</i>	Issue Date: 6/17/15
	Malfunction Abatement Plan	Approved by: Sean Guyett Signature on file

PREVENTIVE MAINTENANCE PLAN - RTO


The operation of the Regenerative Thermal Oxidizers (RTO) is critical to the operation of the paint line (Eisenmann VRTO). Therefore, the facility has a routine maintenance program to ensure that the RTO is operating properly which in turns minimizes malfunctions resulting in a loss of production on the either press. In addition to the periodic checks performed by facility staff, the company contracts with an outside service to perform annual inspection of the unit.

The following is a schedule of the routine maintenance performed on the unit, supervised by the Paint Maintenance Manager.

Frequency	RTO Equipment - Group	Equipment - Specific	Task
Daily			Check for unusual temperature trends.
			Check & record rotor motor amps.
			Check & record flame signal of burner.
			Check & record general operation parameters of the VRTO-C.
			Check combustion chamber/burner flame through the sight glass.
			Visually examine system (gas train, fans, gearmotor, flexes, ducts, dampers, and doors). Listen for strange new noises.
			Check for excess vibration on fans
Weekly			Check & record exhaust fan bearings (inboard & outboard) temperatures.
Monthly			Open door to lower section and visually inspect. Check rotor, seals & internal flex connectors.
			Grease fan bearings. See exact schedule listen on fan.
Quarterly			Grease/lubricate damper bearings, linkages, actuators, & door hinges.

	DELTA EXTERIOR SYSTEMS (DEXSYS)	<i>Document Code: ENV-36</i>
	<i>Procedure</i>	<i>Issue Date: 6/17/15</i>
	Malfunction Abatement Plan	<i>Approved by: Sean Guyett</i> Signature on file

			Hand operate/turn spare gearmotor to keep bearings/gears unsullied.
Semi-annually			Trip all safety devices, see faults on block schematic.
			Grease UV joint. Both knuckles and spline with special high temperature grease.
			Remove blind flanges or access doors in exhaust ductwork and inspect.
			Any unusual to excessive deposits have to be removed. When going into the duct make sure the lines have been purged and the inspection doors in the duct are open to ensure ventilation. Also, respect any OSHA rules for confined spaces.
			Inspect the vessel lower section and ductwork. Clean and remove any flammable condensed liquids or particulate.
			Check all damper operation by moving them into their extreme position (Manual operation from panel). Make sure limit switches are reached.
			Clean lens of UV scanner.
			Check stuffing boxes if applicable.
			Check bolts for tightness. Especially fan bearing bolts.
			Examine combustion chamber. Check ceramic block, insulation and steel baskets.
			Inspect burner. Check spark plug & pilot.
			Examine piping for pressure switches.
			Check combustion blower filter & clean/replace when necessary.
			Examine rotor. Check gap & seal condition. Grease rotor bearing with special high temp. grease.
Annually			Clean gas filter/screen (watch, listen & smell for leaks in gas train).
			Eisenmann guided inspection.

	<i>DELTA EXTERIOR SYSTEMS (DEXSYS)</i>	<i>Document Code: ENV-36</i>
	<i>Procedure</i>	<i>Issue Date: 6/17/15</i>
	Malfunction Abatement Plan	<i>Approved by: Sean Guyett</i> Signature on file

			Clean out and re-lubricate all fan bearings.
			Grease motors.
Every 2 years			Check battery on PLC and replace if needed.
			Change gearmotor lubricant. It is suggested to install and new gearmotor and internally examine the old one. Replace seals & bearings. Keep as spare and repeat process every 2 years with operating gearbox.

The Maintenance Manager will maintain on file a log of all preventive maintenance activities to demonstrate compliance with this Malfunction Abatement Plan.

A list of recommended spare parts has been supplied to ensure the unit functions as intended.



DELTA EXTERIOR SYSTEMS (DEXSYS)

Document Code: ENV-36

Procedure

Issue Date: 6/17/15

Malfunction Abatement Plan

Approved by: Sean Guyett
Signature on file

EISENMANN STRUCTURED SPARE PARTS LIST
76-2297-7600 RTO


DexSys

Revision: 1

Revised: 10/8/2014

* Part Classification : S = Spare Part R = Recommended Spare Part W = Wearing Part

Table with columns: Consecutive No., Spare Parts-List-No., Level, Pos. in Higher Drawing, Complete Description, EISENMANN-Drawing-No/Format/Index, EISENMANN-Item-No., Manufacturer, Length, Width, Unit of Measurement, EISENMANN-Ordering-No., Total Qty On-Hand, Manufacturer Recommended for Stock Keeping, Part Classification.

	<i>DELTA EXTERIOR SYSTEMS (DEXSYS)</i>	<i>Document Code: ENV-36</i>
	<i>Procedure</i>	<i>Issue Date: 6/17/15</i>
	Malfunction Abatement Plan	<i>Approved by: Sean Guyett</i> Signature on file



RTO Spare Parts
List.xls

(contents of file pasted above file icon)

DexSys will maintain spare parts as recommended for items that cannot be received within 24 hours upon ordering.

DATA COLLECTION AND AUTO ELECTRONIC NOTIFICATION SYSTEM

DexSys records pressure differential data from the paint line as well as temperature data and bypass valve position for the RTO. For these systems, a data point is recorded and logged at each location in 15 minute intervals. The previous twelve 15 minute data points are averaged together to generate the 3 hour average. Both 15min and 3hr averages are collected while the paint line is operating. DexSys retains records of 15min and 3hr average data.

Email notifications are sent to all pertinent employees if the most recent 15min data point of pressure differential data is above -0.007 inWc. Email notifications will also be sent to all pertinent employees if the most recent 15 min data point for RTO temperature drops under 1500⁰F or if the most recent 15 min data point for the bypass valve indicates that it is open.


If the bypass valve is opened, the 3 hour average for the pressure differential data is above -0.007 inWc, or if the 3 hour average of RTO temperature is under 1500⁰F, painting operations will automatically stop. Painting operations will resume once compliance is achieved and the system is verified to be operating correctly.

FUGITIVE EMISSION MINIMIZATION PLAN

Fugitive emissions are generated whenever solvent containing materials are exposed to atmospheric conditions. To minimize these emissions, all materials are to remain in closed containers until their use is required.

Interlock System

The paint application system in each booth will be equipped with an interlock to the RTO such that if the RTO were to fail, all units would shut down operation. In the event of an unforeseen failure and to prevent disruption to the customer, DexSys may bypass the interlock and would limit emissions to only manufacture what the customer requires for a 24 hour period while servicing the RTO to working condition. DexSys will notify the District Supervisor via phone in

	<i>DELTA EXTERIOR SYSTEMS (DEXSYS)</i>	<i>Document Code: ENV-36</i>
	<i>Procedure</i>	<i>Issue Date: 6/17/15</i>
	Malfunction Abatement Plan	<i>Approved by: Sean Guyett</i> Signature on file

the event of such an incident and follow-up the incident with a written report of the findings and corrective actions.

Date	Revision	Prepared by
6/17/15	Initial release	Kristen Zielinski
3/1/19	Revised list of preventative maintenance items to better match items in the RTO manual. Added revision log.	Tim Gibbons