CASE STUDY: REGENERATIVE THERMAL OXIDIZER

Natural Gas Savings

Steel Drum Manufacturing Plant Achieves Energy Efficiency & Environmental Benefits Using RTO & Expanded VOC Collection

Success Story

The plant manager was motivated to reduce emissions to the point where the plant would be a small emitter and below EPA regulations. Disruptions to production scheduling were also a concern.

Solution Dynamics' project engineer worked with the RTO supplier and the plant's environmental consultant to determine the best path for achieving the plant manager's goals.

Extraordinary project management challenges were overcome: scope and cost creep were kept in check; difficult sub-contractors were well managed; integrated construction schedules resulted in little or no impact on plant production.

Tight deadlines were achieved with expedited costing, quick analysis turnaround, and on the fly scheduling.

"Open, honest communication and a great working relationship with the plant manager contributed to the success of the project", states Nick Burke, Lead Project Engineer at Solution Dynamics.

The project results were stunning. Emissions were substantially reduced, corporate energy savings goals were achieved, EPA Regulations were resolved, and the local utility company, now with a great relationship with the plant, could begin serving additional customers because of reduced demand from the plant.

CHALLENGE— Reducing Emissions by Capturing VOCs, Recovering Heat, Decreasing Energy Consumption, Improving Indoor Air Quality

A steel drum manufacturing plant was in danger of exceeding EPA Regulations for VOC emissions from their coating and paint curing process lines. Additionally, they were losing valuable recoverable heat, battling excessive energy costs, and suffering compromised indoor air quality due to paint fumes and excess smoke escaping during production.

A detailed engineering analysis, performed by Solution Dynamics, revealed substantial opportunities to optimize and minimize exhaust air flow from the ovens, control VOC emissions with more efficient technology, and reduce energy consumption by installing automated controls on other oven components, such as the cooling zone fans.

SOLUTION— System Flow Balancing, Automated Controls, Expanded VOC Collection System, RTO Installation

The first opportunity implemented included balancing the ovens and controlling the cooling zones, which reduced the amount of energy needed for oven operation. Next, oven exhaust air flow was minimized, but still needed to be treated for post-oven VOCs. Direct-fired exhaust air treatment equipment was replaced with a highly efficient Regenerative Thermal Oxidizer (RTO), significantly lowering the energy needed to treat the VOCs. The efficiency improvement allowed more emission sources to be collected and treated in the RTO. This improvement was analyzed and found to qualify the facility as a small emitter, thereby significantly reducing EPA regulatory filing requirements. Oven flow controls maintained minimum required capture velocities in each oven, and ductwork and equipment connected all oven exhausts to the RTO. Achieving oven balancing alone reduced exhaust flows by 11%, which reduced the size of the RTO needed, which ultimately reduced the plant's capital expenditure.

The local utility company serving the plant is one of the largest combination natural gas and electric utilities in the United States. For more than 30 years, this utility has championed energy efficiency, implementing programs and services that help customers save energy and money.

RESULTS— CO2 and VOC Emissions Reduced, EPA Regulations Resolved, Received Largest Natural Gas Rebate in 2012 Utility Program

- Annual VOC emissions **reduced** by 90%.
- Annual CO2 emissions **reduced** by 789 metric tons.
- Annual cost **savings** realized: $106,120.
- EPA Regulations resolved.
- Indoor Air Quality substantially improved.
- Awarded a Natural Gas Rebate of **$ 691,842**; the largest gas rebate in the utility company's industrial program in 2012.

Key Benefits

Cost Savings	Total annual savings were $106,120.
Energy Savings	Natural gas savings were 15,121 MMBTU/Year—51% of total use at the facility.
Carbon Reductions	Annual carbon dioxide emissions reduced by about 789 metric tons— 35% of the total emissions from the facility (including source CO_2 from electricity).
Pollution Reductions	Annual VOC emissions were reduced by about 90%.
Fuel Type	Natural gas savings were the primary driver for the project.
Payback	Oven Balancing achieved a Simple Payback in less than one year.

Financial Data

Investment	Development: $ 42,000. Equipment/Installation: $ 1,364,693.
System	System flow balancing, automated controls for cooling zone fans, new expanded duct collection system for VOCs, new RTO, interlocked controls, PLC touch-screen interface, installation & training, in-line natural gas meter for long-term monitoring.
Life Expectancy	20—25 Years.
Incentives/Rebates	$691,842 in utility incentives.

Customer Profile

Headquarters	Delaware, Ohio
Locations	Over 250 operating locations in more than 50 countries.
Number of Employees	14,000
2012 Estimated Sales	$ 4.27 Billion
Industry Type	Manufacturing— produces steel, plastic, fiber, flexible and corrugated containers, packaging ac-