



Case Study

A Turnkey Installation for New England Container Company

Gerry DiSchino, President of New England Container Company, was under the gun to purchase an air pollution control system to clean up the VOCs emitted from a paint line at their Baltimore, MD steel drum recycling facility. He looked to NEC's environmental consultant Max Kurbjun of the STEP Corporation and NEC's Rick Costa, corporate Vice President of Engineering, to help him narrow the field of contenders.

Russell-Stanley, NEC's parent company and perhaps the largest drum manufacturer/recycler in the United States, ultimately chose a turnkey installation of Cycle Therm's 16,000 scfm 2-chamber RTO.

The Search Begins

"We sent a request for proposal, giving specific application data to 5 regenerative thermal oxidizer suppliers", says Max Kurbjun. "We requested a complete turnkey package and opened the field to all types of RTO systems, knowing full well the pluses and the short comings of each. We asked for detailed system data, including proposed equipment to be supplied such as fan supplier, burner manufacturer, type of heat recovery media, etc."

Continued Kurbjun, "We scrutinized the utility requirements as well as the quality of the proposed equipment supplied. We then compared proposals. **It was interesting to note that the materials of construction, safety equipment, utility costs and quality of equipment proposed differed considerably from vendor to vendor.**"

In scrutinizing the proposals, Kurbin and DiSchino also found that in many instances there were major items, such as exterior insulation, free standing stack and access platforms, which they knew were required to be part of a turnkey system but were not mentioned at all. In some cases there were extra cost items shown on the proposals, such as start up, shipping charges, etc, where pricing was to be determined *after* the fact.

"Interesting was the fact that when we added in the unmentioned hidden costs and factored in operating costs, that the initial low bidder slipped to fourth place, when it came to pricing a complete turnkey project.", said Kurbin. "What we thought would be an easy process of picking the low bidder turned out to be a considerable exercise."

Kurbin continued, "Since I was making the recommendation for purchase, partly based on the overall turnkey price, I wanted to make *very* sure that I didn't have to go back to my client to request additional money for required equipment that had I missed in evaluating the proposals. My credibility was on the line."

Narrowing the Field

After much consideration and comparison, NEC narrowed the field of contenders down to two companies and NEC's top management spent the next week visiting RTO sites with oxidizer applications similar to theirs.

"After the first visit, we were pretty sure of what we wanted and didn't want," says Rick Costa, a 25 year rotating equipment veteran. "Given the type of equipment reliability we require to keep our drum line going non stop, we didn't want to add maintenance downtime by purchasing something with a very complicated design or which we considered to have noticeable short comings; no matter how large, well known or what the warranty included or how reputable the vendor was. The way we looked at it was," "The best warranty we could get was the one we never had to collect on"

"We then sat down with Richard Greco, President of Cycle Therm.", says Gerry DiSchino, President of NEC. "Mr. Greco explained the theory behind and operation of Cycle Therm's 2-chamber RTO. Some of it was, perhaps a little too technical for me, but Rick Costa and Max Kurbjun felt comfortable with the technology and equipment and I felt comfortable with Greco and his credentials; that was the important thing.

Greco then took us back to the fabrication facility to witness the operation of their patented, full sized, electro-mechanically operated, packaged chamber transfer valve. He turned it on and ran it for about 15 minutes. I was amazed. So simple; I understood how it worked without having to ask a single question."

The Decision

On May 12, 1999, NEC presented Cycle Therm with a purchase order to design, fabricate and install a 2-chamber 16,000 scfm regenerative thermal oxidizer with 95% heat recovery. To make the project truly turnkey, the purchase order was later revised to include a process duct system as well.

Installation

The unit was delivered to the Baltimore site July 28, 1999 and was accepting process input on August 20, 1999; just *12 weeks* from when Cycle Therm received the purchase order.

To save NEC valuable time and money on mechanical installation, the prepackaged RTO system was shipped directly from the fabrication facility in four preassembled pieces:

1. Complete main housing with burner, pipe train, pre-wired and installed thermocouples, recovery chambers preloaded and sealed with Cell Stone® heat recovery media, etc
2. Chamber transfer valve: pre-packaged and pre-tested (3,500 cycles)
3. Robinson fan with pre-mounted 100 hp TEFC motor and vibration switch
4. 35' stack and platform

The electrical installation included a pre-wired, air conditioned walk-in enclosure which housed the pre-tested control panel and Siemens VFD included for system operation.

Operation

Cycle Therm's RTO, which is brought up to full operating temperature daily from a cold start in less than 20 minutes by the Maxon burner system, eliminates the need to idle the RTO overnight or have someone come in hours early to start and heat up the system before process input could commence.

The entire RTO system, using a Robinson induced draft fan, utilizes less than 100 HP with 6.05" w.c. process suction pressure at full design volume and pulls directly from NEC's paint drying oven and paint spray booth without an intermediate process push fan. All of the suction required to exhaust the oven and paint spray booth is generated by the RTO.

Given the type and quantity of paint thinners (VOC) NEC utilizes in their drum painting line, the heat capacity of the solvent is sufficient to allow the RTO to hover at the self sustaining point with very little supplemental fuel required to maintain combustion temperature.

Compliance tests sanctioned and witnessed by the Baltimore Department of Environmental Protection in November indicated **destruction efficiency consistently above 98.5%, approaching 99%** at 1400 °F for three tests; remarkable for a 2-chamber RTO at that temperature.

Why NEC Chose Cycle Therm

In addition to Cycle Therm's straightforward all-inclusive proposal and Richard Greco's impeccable credentials and experience in the pollution control industry, NEC was also impressed by Cycle Therm's unique, patented technology.

Patented Mechanical Valve Drive Technology

The heart of Cycle Therm's RTO system is a patented, zero leakage chamber transfer valve which is the most trouble free and lowest maintenance valve and drive system available today.

Unlike other RTOs which feature problematic pneumatic or hydraulic valve systems, the Cycle Therm RTO features a simple electro-mechanical valve and drive system, providing years of trouble-free continuous service.

The valve is manufactured as a stand alone package that is installed between the fan and the RTO. It has one electrically driven drive motor which is inter-tied by a common drive shaft to two, 3-port valves. On command, the drive shaft, through a cam arrangement, transfers the 2 valve disks in opposite directions, thus changing the direction of flow through the RTO; hence regeneration. Transfer occurs in less than 0.40 seconds.

"Transfer is so fast, that if you blink your eyes you miss the change." says Max Kurbjun. Rotation of the valve control motor is actuated electronically so as to accelerate the valve disc for 0.2 seconds and then decelerate for 0.2 seconds, bringing both discs in unison to a non slam stop.

Because of the speed of transfer, the generic pressure fluctuation and VOC system bypass (puff) associated with 2 chamber RTOs is severely diminished. To almost eliminate the puff and pressure bounce, Cycle Therm's RTO incorporates a proprietary "vacuum break" system. This simple patented design features a 3rd valve, also connected to the main drive shaft, which is synchronized to only open during chamber valve transfer. The valve opens in a lightening fast 0.2 seconds, but slowly closes in 4 seconds.

This valve, which admits fresh air to the system, *eliminates the deep shock process vacuum* generic to all 2 chamber RTOs when the chambers transfer. The fresh air admitted displaces both the VOCs bypassing the unit and increased shock volume from the process.

Heat Recovery Media

The 2 chamber canister design, with an overhead combustion chamber utilizes a stainless steel heat recovery support structure. Cycle Therm's proprietary heat recovery media, Cell Stone®, designed specifically for use in Cycle Therm's RTOs, supplies the regeneration.

Random packed Cell Stone® is manufactured of light weight silicon carbide and has an extremely large surface area coupled to a very large void area. These characteristics increase thermal efficiency, while at the same time reducing pressure drop and horse power requirements. The combination of high heat recovery with low pressure drop results in significantly lower gas and electric usage, as well as higher VOC destruction efficiency, making it one of the most environmentally responsible pollution control units available.

NEC Today

As of 2008, the RTO installed for NEC is still in operation and performing flawlessly.

About Cycle Therm

Cycle Therm is an international leader in the design, fabrication, and installation of Regenerative Thermal Oxidizers (RTO). The RTO we bring to market today is the genesis of over 30 years of design experience focused on a single product.

In addition, Cycle Therm provides turnkey installation services, repair and refurbishment and is a distributor of Cell Stone heat recovery media and tower packing.

For More Information

For more information on Cycle Therm's RTO, turnkey installation or Cell Stone® heat recovery media, please call 570-839-8836 or visit us on the web at www.cycletherm.com.

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