Annual Energy Savings Of $675,000 Due To VOC Abatement

Operating two regenerative thermal oxidizers (RTOs) for the last 25 years, Soliant LLC of Lancaster, SC considered what repairs were needed to keep them operating reliably. The company approached Dürr Systems Inc. EES [1] to assess and recommend repairs on the oxidizers to keep them running with high volatile organic compound (VOC) destruction efficiency.

Soliant is a leader in precision coating of durable films and laminates, plus provides contract coating and laminating on a global scale. Dürr Systems Inc. EES, a VOC abatement system supplier, has been partnering with its clients for the last 10 years to reduce the energy consumption required for VOC abatement through its Energy Performance Contracting program.

After inspecting the equipment, Dürr determined that the old oxidizers were designed with low thermal efficiency to accommodate VOC loading significantly higher than their current levels. Under current operating conditions, these old oxidizers were gas hogs.

Old oxidizer gas usage, in 2006, accumulated to approximately 56,675 Dekatherms (dth) at an average of $10.78/dth, totaling $610,956 per year or $50,913 per month.

Energy-Saving RTO Replacement Project

In 2007, Dürr installed a new RL60 rotary valve RTO to replace Soliant’s old oxidizers. The system went online December 17, and the Energy Performance Contract began January 1, 2008. Through June 2008, the RL60 reduced the company’s gas usage for VOC abatement by 85 percent.

With its long-term gas supply contract ending in June of 2008, Soliant is looking at a spot gas price of $15/dth and a contract price of $14/dth for uninterruptible service. At its current contract natural gas price, the RTO replacement project saves Soliant an average of $56,500 per month.

Old RTOs	Natural Gas Usage (dths/month)	Operating Cost ($/
2006 average	4,723 (56,675 dth/year)	$66,122/mon
New RL60 RTO		
January 08	734	$10,276
February 08	782	$10,948
March 08	650	$9,100
April 08	726	$10,164
May 08	609	$8,526
June 08	617	$8,638

Average Month	686	$9,604/mont
Gas Savings	4,037 dth/month	$56,518/mon

Energy Performance Contract

Furthermore, Dürr financed the project under an Energy Performance Contract, which required no capital investment from Soliant. Jim Griffin, Dürr regional sales manager, notes, “Soliant was interested in the oxidizer replacement project and the energy savings it would generate, but they had already budgeted its capital resources for expanding production to meet increasing demand. It’s a story I hear frequently from customers, and it’s the primary reason Dürr began financing energy projects.”

“As a small company, we thought it was a good way to implement a greener solution without a large capital outlay,” says Soliant Vice President of Operations Jeff Bailey. “The performance guarantee ensured both sides have a vested interest in improvement.”

As part of the arrangement, Soliant agreed to pay Dürr a fixed monthly fee from the natural gas savings generated by the RTO replacement. Dürr guarantees the RTO’s measurable thermal efficiency for the full contract term.

The contract also includes bonuses for exceeding the guaranteed thermal efficiency and penalties for falling short of the guarantee. This means that if the RTO performance falls below the guaranteed level, Dürr pays for Soliant’s additional gas usage and has an incentive to address the issue immediately.

It is not uncommon that savings from energy projects begin to deteriorate long before the payback period is over. The Energy Performance Contract tackles this issue by putting the risk of ongoing performance on the equipment supplier, while giving both the end user and the supplier a vested interest in continuous monitoring and system tune-ups to maximize energy savings.

Overall, the company’s net monthly operating expense was reduced because of the performance contract, since the average natural gas savings exceeds the monthly payment for the equipment. As an additional benefit, at the end of the contract term, Soliant owns the equipment outright and thus keeps all the energy savings.

“Soliant was in a position in which its production depended on the operation of two 25-year-old oxidizers that cost them $66,000 per month in gas alone. By using the [Energy Performance Contract] to fund the RTO replacement, at the end of the contract they will have an RTO that costs them just $9,600 per month to run,” says Griffin.

Service & Maintenance Advantages

In assessing the situation when asked to consult on the project, Dürr estimated that the cost to repair the aging units would have been around $250,000. By making a

decision not to invest in the old equipment, Soliant felt that they would achieve not only energy savings, but also a significant reduction in maintenance costs going forward.

“There’s really no comparison between the old and the new equipment,” says Bailey. “The old system had 42 hydraulic valves for controlling air flow, which were a maintenance headache. The new Dürr unit has a single rotating valve, which requires minimal service and is a much simpler design.”

More specifically, the Energy Performance Contract includes:

- Monthly performance monitoring and reporting.
- 24/7 emergency phone support.
- Remote trouble-shooting online with the system PLC via a new modem.
- An extended warranty.
- Semi-annual inspections and preventive maintenance visits.

Because Dürr’s payment depends on the system’s performance, it is critical from the company's perspective that it continuously monitors performance, and regularly inspects and tunes the system. “Since the Dürr equipment services our entire coating department, 24/7 support is critical,” mentions Bailey.

Room To Grow

An additional benefit to Soliant is that it now has abatement capacity for a new production line, the exhaust from which could be routed to the old oxidizers. Soliant’s old oxidizers are still in place and ready to run. A new process could be connected to them with just minor ductwork changes.

Technical Advantages Of New Vs. Old

Technical Comparison	Old Oxidizers	
Number of fans	4	
Number of valves/actuators	42 (14 in, 14 out, 14 purge)	
Number of burners	2	
Ambient noise level	Very high	
Control panel	Inside plant; no HMI to display system information	Re

The new RL60 RTO system is about a quarter of the size of the old two-oxidizer system as a result of significant developments in RTO design over the last 25 years. Whereas the old RTOs were arranged with seven horizontal flow ceramic media beds radiating outward around a central combustion chamber, the RL60 uses a vertical flow arrangement with the combustion chamber sitting atop 12 pie wedge-shaped ceramic media beds, all in a single can.

The ceramic media bed area has also been substantially reduced by the use of structured honeycomb ceramic blocks, which accomplish the same heat exchange at 50 to 100 percent higher velocity than randomly packed ceramic saddles.

In addition to the reduced size, the new system offers other technical advantages that simplify and reduce maintenance, including fewer moving parts and a modern easy-to-use control interface.

Dürr delivered and installed the RL60 in November/December 2007 while Soliant continued production. Only five days of shutdown, split between two weekends, were required to complete the ductwork tie-ins to the existing process duct and stack, and to wire interlocks to the process.

The RL60 “skid,” including the rotary valve, drive system, combustion chamber support steel, gas train and control room, was completely assembled, pre-wired and pre-piped in the manufacturer’s shop.

By implementing this RTO replacement project under an Energy Performance Contract, Soliant was able, with no capital outlay, to expand its VOC capacity for future production lines, save more than $675,000 annually guaranteed, replace aged equipment with a state-of-the-art machine, avoid $250,000 in repairs, and get long-term supplier monitoring and service.

“Our goal is to offer environmentally friendly products and push for more efficient equipment leading to reduced energy consumption,” says Soliant President Jerry Patton. “This equipment is helping us accomplish that goal.”

According to Walt Smith, Soliant plant engineer, the decision to purchase the equipment from Dürr has proven to be the right one. “The RL style thermal oxidizer designed by Dürr demonstrates that the oxidizer is a solid system using proven technology. My only question is ‘Why did we wait so long?’”

Source URL (retrieved on *07/12/2014 - 2:46pm*):
http://www.chem.info/articles/2008/09/annual-energy-savings-675000-due-voc-abatement

Links:
[1] http://www.durr.com/