INDUSTRIAL DIVISION

CASE STUDY

The steadily increasing natural gas prices near the end of 2004 were becoming a substantial operating cost burden on a facility producing automotive paint and coatings and developing coating products. The major consumers of natural gas at this facility were the main system of boilers which supplied steam energy throughout the facility and two Regenerative Thermal Oxidizers (RTOs) which controlled the Volatile Organic Compound (VOC) and Hazardous Air Pollutant (HAP) emissions to the atmosphere. One of the RTOs controlled the emissions from the 100,000 Standard Cubic Feet per Minute (SCFM) exhaust stream collected from the coatings production processes and buildings. The other RTO controlled the emissions from the 150,000 SCFM exhaust stream collected from the research and development processes and buildings. The facility had recently updated and replaced much of its boiler equipment to allow more efficient boiler operation, but the decrease in overall facility natural gas consumption was not near adequate to overcome the increasing natural gas prices.

The facility had been in contact with several engineering and consulting firms and air pollution control equipment manufacturers to evaluate their existing emission control systems for improvements. With the two existing RTOs consuming a total of 20 to 25 Mcf/hr of natural gas, this was determined to be the greatest area of cost reduction opportunity to make an impact on the rising utilities. Catalytic Combustion Corporation sent a team to assist in the evaluation of the current emission control system and provide options and alternatives to meet the facility's pollution control and cost reduction needs.

After evaluation of the existing systems, testing of the exhaust fume streams, and examination of the current and expected chemical emissions, Catalytic Combustion revealed possibilities to substantially cut the facility utility consumption. Catalytic Combustion also uncovered several other related opportunities to provide a solution that would not only cut the utilities costs, but increase the performance level and ease the operational and maintenance requirements for the emission control equipment. Catalytic Combustion offered an integrated VOC concentrator and RTO emission control system that would replace the existing RTO units and process the full 250,000 SCFM of fume streams from the entire facility. The high volume air stream with relatively low solvent loadings of 100-200 lbm/hr immediately exposed the potential of utilizing concentrator technology. Catalytic Combustion also performed the required analysis of the existing and possible future facility emissions to ensure that transitioning to the concentrator technology would be a successful approach in meeting the facility's long term requirements.

In the first quarter of 2005, Catalytic Combustion was given a contract to design a custom system to combine the exhaust streams from all of the production and research buildings and install a new system within the limited space constraints of their facility. Although the existing RTO units consumed a significant amount of facility space that provided ample area for reuse by a replacement unit, the regulatory requirements required that these systems remain operating with minimal down time to transition to a new pollution control solution and the facility wanted to minimize any demolition and removal costs. Catalytic Combustion submitted designs that merged the workmanship expected of their manufacturing facilities and equipment with the options provided by its strong supplier relationships. The facility took advantage of Catalytic Combustion's international suppliers to provide the uniqueness of equipment and performance offered by a global supplier outlook and combined that with the cost and logistics savings possible with Catalytic Combustion's area contractor and supplier relationships to provide quality general trade products and services. The system design was approved and manufacturing scheduled to support a system commissioning by the beginning of October 2005.

The system manufacturing phase and installation phase proceeded as scheduled until some additional regulatory concerns were raised during the beginning of September. The concern of ozone action days occurring during the month of September and additional unexpected down time of one of the existing RTO systems, which was consistently decreasing in operational reliability, led to increased pressure on the facility. The local regulatory agency further reduced the time they had originally allowed to transition from the existing units to the new emission control system. Catalytic Combustion mobilized the additional personnel and equipment to expedite the operational testing of the new concentrator and RTO system. The project schedule was also accelerated to reduce the installation time required to transition from the existing RTOs and interface with existing upstream equipment. Overall, the downtime for the system transition was done in 5 days compared to the 14 days scheduled and the overall system commissioning was completed 17 days ahead of schedule. Although the local environmental authority required immediate interruption of all production and/or development operations during any ozone action days that could occur during the equipment transition, the plant didn't lose any production or research time with the accelerated schedule. In addition, the facility saved approximately $110,000 in utility expenses by bringing the new concentrator and RTO system online to replace the functionality of the existing RTOs over 2 weeks early.

Catalytic Combustion provided calculated design utilities consumption data for the new system based upon expected operating conditions which identified the potential to achieve up to $200,000 per month in combined natural gas and electricity utility savings. The system was further optimized during the system commissioning based upon the actual process conditions and even greater savings were realized. During the month of October 2005 with the decreased utility requirements of the newly applied technology, the facility had cost savings of near $211,500 in natural gas expenses and about $28,400 in electrical utilities. This totaled approximately $240,000 in utilities savings in its first full month of operation.

The utility savings have continued with the new system only consuming about 10% of the natural gas used by the prior RTO systems. The system performance has also proven to be much more steady and reliable as evidenced by the initial system acceptance testing in October 2005 and continuing regulatory compliance testing done in September 2006. The replaced RTOs consistently required maintenance and repair activities to keep their performance at a level that barely met the Destruction and Removal Efficiency (DRE) requirements for the air pollutants. The new concentrator and RTO system has provided consistent performance that has allowed a DRE performance that cleans the VOC pollutants to a level three to four times below the permitted requirements. The steadily decreasing reliability and performance of the old RTO units would have necessitated significant updates or replacement to maintain environmental compliance. This replacement not only accomplished continued compliance, but the utilities savings alone recovered over 70% of the project cost in the first year of operation. By designing and applying the most appropriate emission control technology for the facility, a solution was delivered that satisfied not only the engineering, maintenance, and regulatory requirements from the operational section of the business, but also provided an exceptionally beneficial capital investment for the financial section of the business.