

Application Report

AR-146

Biothermica Builds Eclipse Ratiomatic Burners Into Award-Winning BIOTOX® Regenerative Oxidation Systems For VOC, COC and Odor Removal

Two leading-edge combustion technology companies join forces to provide environmental benefits while creating value for industrial manufacturers and processors.

Biothermica International, Inc., in Montreal, Quebec, Canada, is a rapidly growing technology firm engaged in the research and development of practical turnkey solutions to the problems associated with air pollution and the production of energy from waste. Founded in 1987, the company specializes in the design and engineering of processes and systems targeted towards eliminating foul odors caused by industrial processes, and especially to minimizing or eliminating volatile organic compound (VOC) and condensable organic compound (COC) emissions. These compounds are toxic to our environment, contributing to urban smog and the greenhouse effect and adversely affecting human health. Biothermica's staff of engineers, scientists and technicians have developed considerable expertise in thermochemical processes applied to waste oxidation, gas combustion and high-temperature dust removal.

For decades, governments around the world have attempted to reduce or neutralize VOC and COC emissions

through increasingly stringent environmental regulations, and many companies are proactively seeking cost-effective methods of compliance. Biothermica's three main areas of research are regenerative oxidation processes, gas landfill, and particle emission control. The company's clients span a wide range of industries and include manufacturers of asphalt shingles, fiberglass, pharmaceuticals, paints, inks, coatings, plastics and rubber, as well as companies in the pulp, printing, chemical, and agri-business processing industries.

The BIOTOX Process and How It Works

In 1994, Biothermica received the Canada Award for Business Excellence for its development of the BIOTOX® process, a regenerative oxidation process that can treat VOCs and COCs simultaneously, effectively destroying more than 98 percent of these emissions and their accompanying noxious odors. Exclusive to Biothermica, the process offers several distinct advantages over alternative methods. First, it is cost-effective, requiring minimal maintenance and offering energy savings of up to 95 percent due to efficient heat recovery. Moreover, with the BIOTOX process, there is absolutely no air-water-ground



The Eclipse Ratiomatic burner system was selected chiefly because of its proportionator-based combustion control system, which ensures reliable long-term performance despite severe conditions and continually changing pressures in the combustion chamber.

pollution transfer, and the sole by-products of the process are carbon dioxide and water.

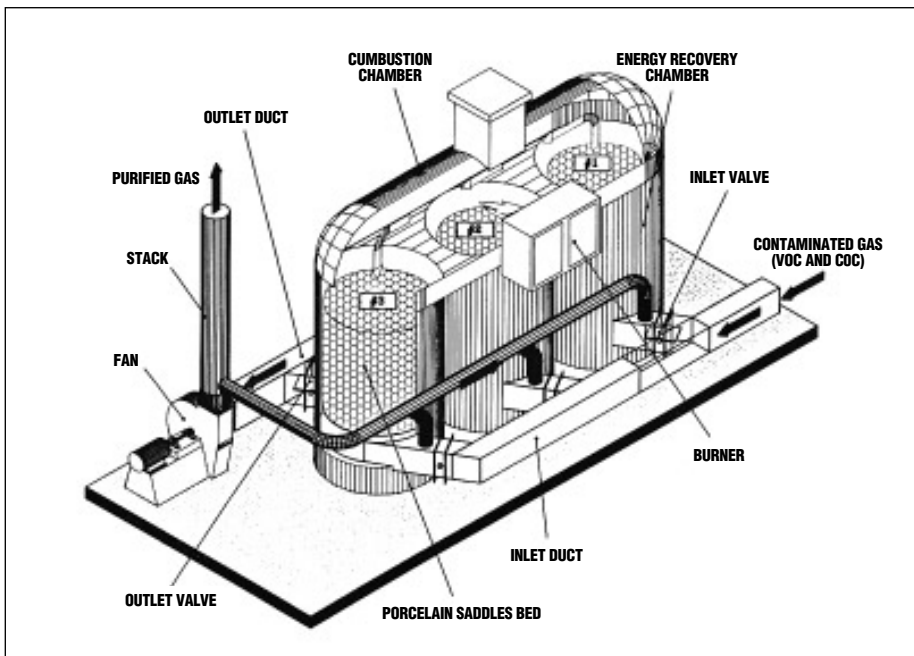
The design and engineering of each BIOTOX system is unique and custom-tailored to the specific application, taking into account the nature and volume of the emissions and other parameters. In operation, the BIOTOX

After combustion, the gas mixture returns down through the ceramic nodules of one of the three heat recovery chambers in order to capture energy and allow the gases to cool. When two of the recovery chambers are in operation—one in the heating mode and one in the cooling mode—a portion of the cleaned gases is directed towards the third chamber to purge the residual VOC and COC. Once the chamber has been cleaned, the cycle is ready to begin again.

This operation of three chambers takes place on a cyclical basis over a short period of time, through the successive action of entry, exit and purge valves. A computer system controls the operation of the BIOTOX process from start to finish, eliminating the need for an operator. At the Building Products installation, the system operates 24 hours a day, seven days a week.

The Importance of a Reliable High-Performance Burner System

In 1992, Biothermica was preparing to install a 15,000 cfm BIOTOX unit for Building Products Company of LaSalle, Quebec, for treatment of condensable asphalt vapor and VOCs. The company sought to incorporate a burner system that could meet certain specific and demanding requirements. Biothermica engineer Mr. Van Nguyen explains: "Because of the cyclical nature of the process, pressure in the combustion chamber into which the burner is firing is continually changing. The pressure varies from a positive of two inches water column to a negative of ten inches water column. We needed a burner that could operate reliably under these constantly varying conditions." In addition, the tar particles contained in heavy VOCs and COCs can be difficult to treat because they have a tendency



The BIOTOX® regenerative oxidation process uses three heat recovery chambers which are preheated before introducing the gases for treatment. Operation of the chambers occurs cyclically over a short period of time through the successive action of entry, exit and purge valves. The entire process is computer-controlled and requires no operator.

regenerative oxidation process uses three heat recovery chambers which are preheated before introducing the gases for treatment. The gases containing VOC and COC enter the BIOTOX unit through a distribution pipe, and are progressively heated as they pass through a ceramic nodule bed before reaching the combustion chamber, which is located in the upper part of the unit. The VOC and COC ignite on contact with the ceramic nodules kept at a high temperature. Additional energy, in the form of natural gas or other fuel, may be required to keep the temperature of the combustion chamber at 1382°F (750°C). The combustion temperature is adjusted to minimize the formation of nitrous oxide (NOx).

to accumulate and ignite along the treatment walls.

Biothermica turned to Eclipse Combustion in Montreal for recommendations. Harry Ajamian, technical sales representative for Eclipse, recalls: "We felt confident recommending the Ratiomatic burner system for Biothermica's application. Eclipse RM burners have an excellent track record for high performance and utmost dependability, even in severe environments. Ratiomatic firing tubes out there have been firing for years without a single failure. Furthermore, the RM's proportionator-based combustion control system, and the ability of the nozzle to be over-fired, make the RM capable of handling constantly changing operating conditions with ease."

Mr. Van Nguyen affirms that these factors were indeed influential in Biothermica's decision to specify Eclipse Ratiomatic burners for this highly specialized application. He adds: "The RM burner's precisely-controlled air and gas mix, along with its vacuum and positive pressure operations were key elements in our decision. But we also considered other factors—such as price, the supplier's ability to deliver quickly, fuel costs and energy conservation, ease of operation and maintenance. On all of these points, Eclipse was able to fulfill our requirements." Biothermica specified Eclipse RM 400 and RM 100 Ratiomatic burner systems for the Building Products application.

An Ongoing Partnership

To date, the performance of the BIOTOX system, and Eclipse Ratiomatic burners, in the Building Products Company installation have been impressive, both to Biothermica and to the end customer, who has since ordered a second, even larger, system. Mr. Guy Drouin, Biothermica's President, and Gerard Gosselin, Vice President, have both repeatedly expressed satisfaction with Eclipse products and service. And, as a direct result of the success of the first project, Eclipse Combustion has been awarded eight additional Biothermica projects involving a total of eleven Ratiomatic burner systems.



At Building Products' plant facility in Montreal, Biothermica's exclusive BIOTOX® system operates 24 hours a day, providing effective treatment of condensable asphalt vapor and volatile organic compound emissions.

For more information on the BIOTOX RMO system, you can access Biothermica's web site at: <http://www.biothermica.com> email: biotherm@biothermica.com