a McGill AirClean™ product

RTO Systems

ThermaGrid™ Regenerative Thermal Oxidizers

McGill AirClean LLC

An enterprise of United McGill Corporation –
Family owned and operated since 1951

Economical VOC Control

McGill's innovative regenerative thermal oxidizer (RTO) design provides a better way to control volatile organic compound (VOC) emissions. Our RTO systems combine effective VOC destruction with economical and dependable operation to help you comply with emission regulations at the lowest possible cost. We have an experienced engineering staff to analyze your VOC problem and work with you to develop an optimum solution. Depending on the volume flow, emission types, and destruction requirements of your application, McGill AirClean has different size ThermaGrid™ models to select from when designing your system. Our manufacturing team uses the latest fabrication techniques to produce an RTO system that will provide you with years of dependable operation.

In addition to our RTO systems, we also manufacture dry and wet electrostatic precipitators, fabric and ceramic filters, spray-dry scrubbers, and deNOx reactors for SCR. Our products are backed by more than 40 years of experience solving air pollution control problems for boilers, furnaces, incinerators, dryers, and a variety of industrial processes.

McGill AirClean RTO Features and Benefits

Features:

- High destruction efficiencies
- High thermal efficiencies
- Low pressure drop
- Particulate loading capability
- Ceramic block design flexibility for variable thermal efficiency and pressure drop
- Rugged poppet valve design
- Low maintenance
- Smaller footprint and lower weight
- Modular design

Benefits:

Reliable emissions compliance
Low construction and expansion costs
Low maintenance costs and less downtime
Low operating costs

ThermaGrid RTO system for a fiberboard dryer and preheater (volume flow: 90,000 scfm) controls hydrocarbons, formaldehyde, formic acid, carbon monoxide, aerosols, and wood fiber emissions.

Two ThermaGrid RTO systems (volume flow: 31,000 scfm each) installed inside a plant and controlling organic binders, formaldehyde, and phenol emissions for a fiber glass manufacturing process.

McGill provided its wet electrostatic precipitator upstream of its ThermaGrid RTO to control particulate and d-limonene emissions from a citrus peel dryer.

Front Cover: Four ThermaGrid RTO systems (volume flow: 27,500 scfm each) controlling carbon monoxide emissions at an engine testing facility for a major car manufacturer. McGill provided controls for unattended startup and shutdown of the RTOs based on demand.

How a McGill AirClean RTO System Operates

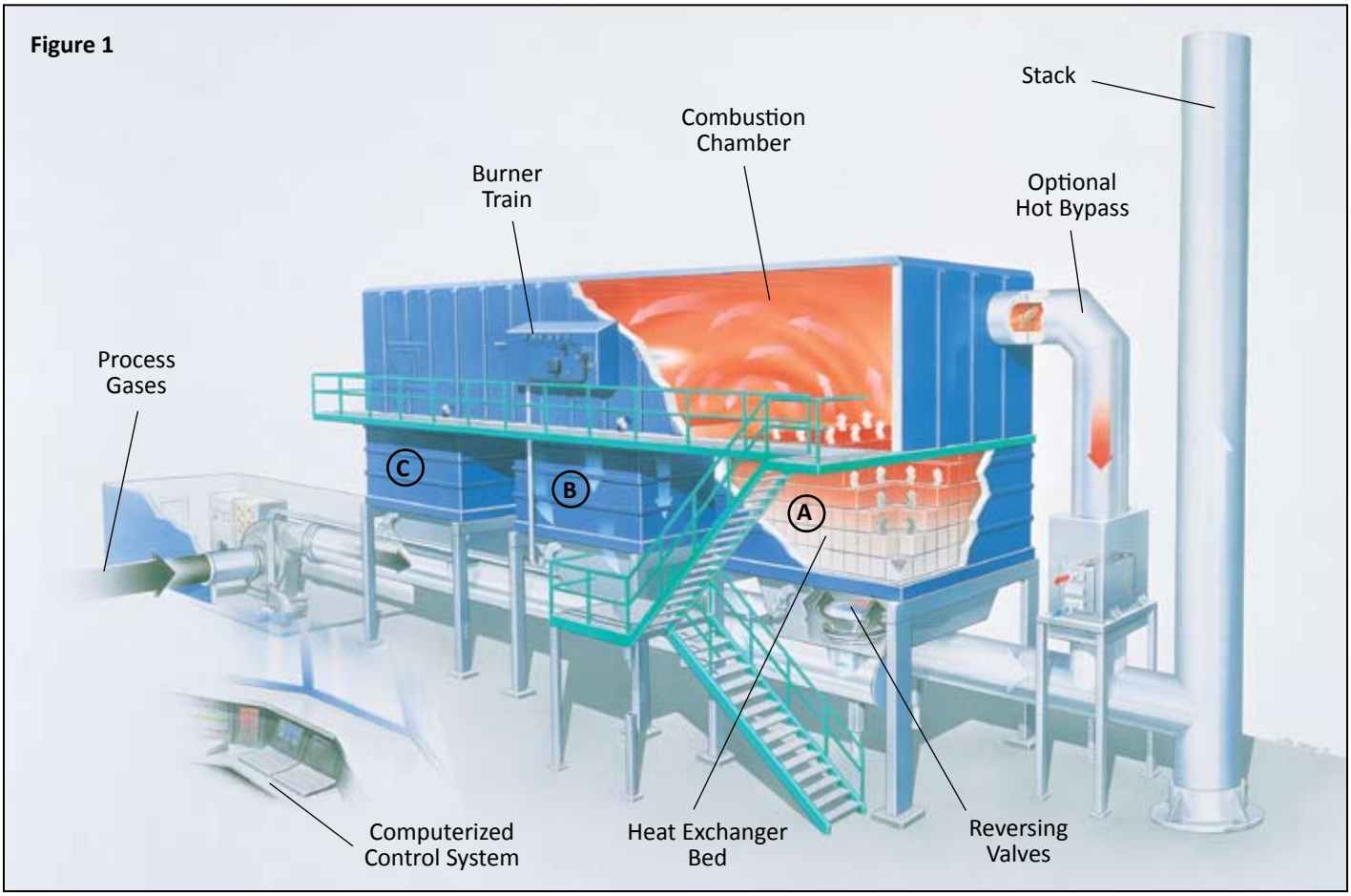
The operation of a McGill RTO system is shown in ***Figure 1***. As contaminated flue gas enters the system, it passes through the bed of monolithic (honeycomb) ceramic blocks in heat exchanger bed A. The ceramic blocks preheat the contaminated flue gas up to near the combustion chamber temperature. Oxidation takes place in the combustion chamber, where high temperature destroys the VOC emissions. If the flue gas has enough VOC content, the heat produced by oxidation will sustain combustion. If the concentration of contaminants is too low to sustain combustion, supplemental heat is provided by a burner. With increased VOC concentration, the supplemental heat requirement decreases. As the cleaned flue gas exits the combustion chamber through heat exchanger bed B, its heat is transferred to that bed of ceramic blocks.

After a preset time (between 60 and 180 seconds) the inlet gas flow is switched to heat exchanger bed B. The ceramic blocks in heat exchanger bed B now transfer their stored heat to the inlet gas while the cleaned gas exits through heat exchanger bed C, which is heating up. At this point, any contaminated gas remaining in heat exchanger bed A is purged and returned to the main gas stream for oxidation. As the regeneration cycle proceeds, the gas flow is switched so that the newly heated heat exchanger bed becomes the inlet and the purged heat exchanger bed becomes the outlet. Using three heat exchanger beds with a purge cycle can provide a VOC destruction efficiency of over 99 percent. For destruction efficiency requirements 98 percent and under, two heat exchanger beds can be used instead of three.

Low Pressure Drop and High Thermal Efficiency

The McGill RTO system is designed to combine low pressure drop with high thermal efficiency. Our RTO systems use monolithic ceramic blocks as a heat transfer medium. The block's design allows straight-through, laminar gas flow with a low pressure drop that greatly reduces operating costs and the potential for plugging and maintenance problems. The design also allows the gas flow to be distributed evenly across all heat transfer surfaces, giving the block approximately twice the heat transfer ability as the same volume of other RTO heat transfer mediums. As a result, the McGill RTO system will have higher thermal and destruction efficiencies, reduced fuel costs, and a smaller bed size.

Figure 1



Smaller Size and Weight

A McGill RTO is typically smaller in size and weight than other RTOs. The size difference can be crucial if there is a limited amount of space at your facility. It means that a McGill RTO can be installed at facilities where a conventional RTO would not fit. And, the foundation required for a smaller RTO costs less.

Low Maintenance Dependability

Our RTO system is designed to operate dependably with little need for maintenance. By allowing straight-through gas flow, the ceramic grid design can handle dirty or particulate-laden gas flows better than other RTOs. Designs using other heat transfer media are prone to pressure drop and plugging problems because they tend to trap the particulate.

Heat Exchanger Bed Cycling

McGill uses low-leakage poppet valves for bed cycling. Most of the parts requiring maintenance are located outside of the process gas stream. These highly reliable poppet valves are linearly actuated and can be electrically, pneumatically, or hydraulically driven.

ThermaGrid RTO systems for smaller volume flows (1,000 to 9,000 scfm) are skid-mounted and electrically heated, making them easy to install or move to various locations. This system for an asphalt loading station (volume flow: 1,000 scfm) controls heavy hydrocarbons, methane, heavy oils, and H_2S emissions.

McGill's modular design weighs less and requires a smaller footprint, allowing the RTO to be installed in tighter spaces than conventional systems.

Design Flexibility

For every RTO application, there is an ideal balance of pressure drop and thermal efficiency that will result in the lowest operating costs. McGill's RTO design allows the flexibility to provide a system with the optimum operating conditions for your application. First, we size the RTO to accommodate the flue gas volume flow of your process. We then design the ceramic block beds to provide the most economical combination of pressure drop, thermal efficiency, and destruction efficiency.

We can choose from among ceramic blocks with four different size openings and vary the number of ceramic block layers and the number of beds. Smaller openings provide greater thermal efficiency, while larger openings lower the pressure drop. Larger openings are also the best choice for process gas with a heavy dust load. Those options allow us to design your RTO system for the lowest operating costs based on the cost of energy at your facility.

Turnkey Service

McGill provides turnkey service for all of our air pollution control systems. We can work with you to design, manufacture, and install a McGill RTO system specifically for your application, assuming total system responsibility. Our engineers will size an RTO system according to your process gas volume flow, and select ceramic blocks with the appropriate opening sizes/surface area. In addition to supplying all equipment, ductwork, and electrical control systems, we can provide field installation. For applications that require more than VOC control, we can supply additional systems to reduce particulate or acid gas emissions. We can also help you make sure your equipment continues to operate effectively and comply with emission regulations. Our service engineers are available to repair, upgrade, and rebuild air pollution control systems.

ThermaGrid RTO system (volume flow: 13,000 scfm) controlling VOCs from a paint oven.

ThermaGrid RTO system (volume flow: 50,000 scfm) controlling formaldehyde and phenol emissions from a fiber glass curing oven.

McGill can provide total system responsibility including field installation. Here the final insulation and lagging is being completed for a three-bed ThermaGrid RTO that controls emissions from a large particle board press.

McGill can use one of our mobile RTOs to perform a pilot test program at your facility to demonstrate the feasibility of using a full-scale RTO to control your emissions.

ThermaGrid RTO system (volume flow: 15,500 scfm) controlling xylene emissions for an electronics manufacturing application.

Products depicted in this brochure were current at the time of publication. As a quality-conscious manufacturer, McGill AirClean is continually seeking ways to improve its products to better serve its customers. Therefore all designs, specifications, and product features are subject to change without notice.

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