

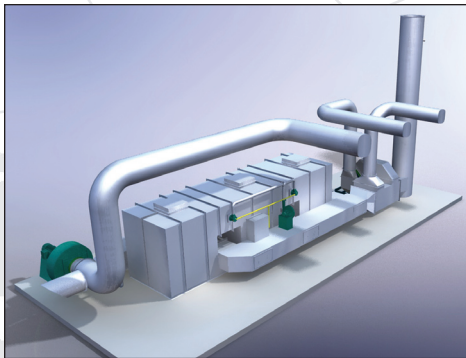
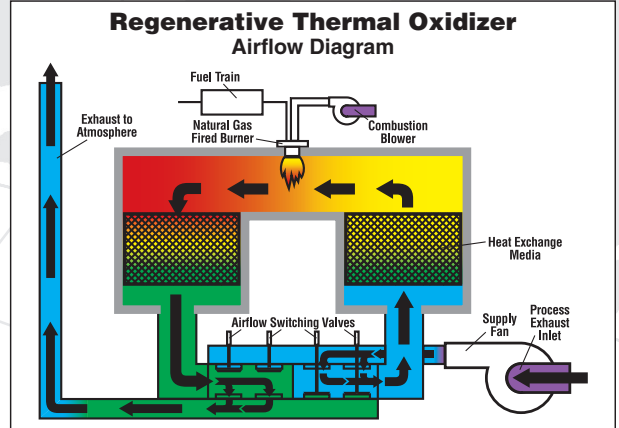
# Regenerative Thermal Oxidizer (RTO)

Regenerative Thermal Oxidizers (RTO's) from The CMM Group, LLC are designed to destroy air pollutants emitted from process exhaust streams at temperatures ranging from 815°C (1,500°F) to 980°C (1,800°F). RTO's utilize ceramic media packed into vertical canisters as a high-efficiency heat exchanger. Oxidation is achieved as pollutants pass through the ceramic media, are mixed, and held at elevated temperatures in the combustion chamber.



The basic design concept of thermal oxidation is to promote a chemical reaction of the air pollutant with oxygen at elevated temperatures. This reaction destroys the pollutant in the air stream by converting it to CO<sub>2</sub>, H<sub>2</sub>O and heat. The rate of reaction is controlled by three-(3) interdependent and critical factors; time, temperature and turbulence.

In operation, the process exhaust fumes are forced into the RTO inlet manifold (with a high pressure supply fan) and directed into one of the energy recovery canisters by use of inlet (switch) valves. The pollutant laden air passes from the valve assembly vertically upward through the first of the heat exchanger canisters where it adsorbs heat from the ceramic media (thus eventually cooling the media). This preheated air then enters the combustion chamber (typically at a temperature very close to that required for oxidation), is thoroughly mixed for temperature uniformity (turbulence) and held in the combustion chamber at the elevated set-point temperature (temperature) for a residence time of ~0.5 seconds (time). Air pollutant destruction takes place within the combustion chamber where auxiliary fuel is introduced if necessary.



After passing through the combustion chamber, the clean (hot) air is routed vertically downward through a second energy recovery canister where the heat generated during thermal oxidation is adsorbed by the ceramic media (thus preheating the media for the next cycle). The clean (cooled) air is routed to atmosphere through outlet (switch) valves, the exhaust manifold and ultimately through the exhaust stack. To maximize the heat exchange, the switching valves alternate the airflow path between canisters to continuously regenerate the heat stored within the ceramic media. Thermal energy efficiencies (TER) range from 85% to 97%. To maintain low external shell temperatures and minimize radiant heat loss, the combustion chamber is insulated with long-life ceramic fiber modules. The external shell is typically fabricated of carbon steel. Air pollutant destruction efficiencies of 99% can typically be guaranteed.

## Standard Features by CMM (Many custom options available)

- High air pollutant destruction efficiencies are guaranteed
- Lowest operating costs available with energy efficient design
- Designed to meet your specific project requirements
- Proven high quality components are used throughout
- Control scheme is designed to automatically react to your manufacturing process
- Modern PLC based controls with color touch-screen interface
- Data-logger is included for recordkeeping
- Meets or exceeds all regulations

## Typical Applications (Varies based on specifications)

- 4,250 to 170,000+ NCMH  
(2,500 to 100,000+ SCFM)
- Suited for air streams with low to high levels of air pollutant
- Common uses include:**
- Chemical processing
  - Converting web dryers
  - Flexographic printing
  - FRP manufacturing
  - Heat-set printing
  - Paint & coatings manufacturing
  - Surface coating
  - Wood finishing & manufacturing
  - Many others...

## Typical Advantages & Disadvantages

- Advantages:**
- Moderate capital cost
  - Low operating costs with low air pollutant concentrations
  - Very high thermal heat recovery
  - Capable of high inlet temperatures
- Disadvantages:**
- Simple two chamber design limited to 98% air pollutant destruction
  - More moving parts, more maintenance



Single Source Solutions For:

**Ovens & Dryers • Energy Recovery Systems  
Air Pollution Control Systems • Production Machinery**

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