SYNERGISTIC ITERATION

2025 NOVELTY EDITION

THERMAL VORTEX FOR BEGINNERS

IT'S NOT WHAT GOES IN... IT'S WHAT DOESN'T COME OUT!

EVERYTHING YOU ALWAYS WANTED TO KNOW ABOUT THERMAL VORTEX, BUT WERE AFRAID TO ASK!

FREQUENTLY ASKED QUESTIONS (FAQS)

Q: Why is this different from every other incinerator out there?
A: Incinerators are usually multi-chamber, or have a moveable grate where the waste sits while burning. In those units the waste material is allowed to smolder, thereby producing odors, harmful emissions, smoke, and even fly ash. They require expensive and complex scrubber systems that clean the exhaust before going into the atmosphere. The ***Thermo*MAX™** is a single-chamber, grateless system that burns the shredded material while fully in suspension in a vortex, where the combination of high temperature and high speed doesn't allow for smoldering, therefore no odors, harmful emissions, fly ash, or even smoke. In addition, through our unique and patented process, the material is re-circulated continuously back into the vortex until it reaches complete combustion.

Q: What exactly is "complete combustion?"
A: There are 3 states of combustion:

1. ***Complete and Perfect combustion***...
   When just sufficient air (oxygen) is supplied to convert all of the fuel into CO2 and H2O

2. ***Complete and Imperfect combustion***…
   When excess air (oxygen) is supplied which gives complete combustion but, air is present in the combustion gases. This excess air actually causes a cooler reaction.

3. ***Incomplete combustion...***
   When insufficient air (oxygen) is supplied, the fuel doesn't completely convert to CO2 and H2O. Some Carbon monoxide (CO), Carbon (C) (as soot) can also form. This is a harmful emission (as from a candle) and from vehicle exhausts, industrial furnaces...etc).

With that in mind, it means that whatever you are burning (usually hydrocarbon) burns or reacts completely with oxygen gas (O2) to form ***ONLY*** CO2 (carbon dioxide) and water (H2O). So that means there are no by-products! Only CO2 and H2O are your products.
Complete combustion yields just CO2 and water. Incomplete combustion occurs when there is an insufficient supply of oxygen, and therefore not all the fuel is utilized and other compounds remain. If incinerators are currently giving off smoke and other emissions, then they aren't achieving complete combustion.

Q: So what exactly comes out of the stack?
A: Simply put; hot air. Because our unique and patented process not only combines high temperatures and a high speed vortex, but the re-introduction of the material into the vortex to continuously burn, it doesn't produce these harmful emissions. The shredded waste also acts as its own fuel, and burns to complete combustion.

Q: Why do people hate incinerators so much?
A: It's very understandable considering that most of the incinerators that are used for municipal waste disposal are massive, unpleasant monstrosities that belch nasty smoke and odors from their towering smoke stacks. However, there are also misconceptions that have lingered in this debate for decades. The ***Thermo*MAX™** not only doesn't give off smoke and odors, but it has a small footprint that allows it to be installed closer to populated areas then current systems. Something known as NIMBY (Not In My Back Yard) has also played into the emotional aspects of this issue, mostly because the big incinerators are also eyesores.

A FEW TECHNICAL DETAILS

Q: What is Synergistic Iteration?

A: Our technology offers a unique blend of various processes, that together in this blend or combination, creates a result that is greater than the sum of its parts. This is known as synergy. The iteration is the portion of our system that takes any unburned and yet still combustible materials and reintroduces it back into the vortex, where it will continue to burn over and over until totally destroyed. Combining the synergy and the reintroduction, we create a tremendously efficient process that allows us to offer greater results than any other technology available today.

Here's how we do it:

First, we start off with an understanding of our fuels available. As you can see from this chart below, various waste materials offer different thermal values, or BTUs. Because of our unique design and our advanced technology, we can easily use multiple fuels at the same time, regardless of their BTU value. We do that by simply creating a "recipe" from the available fuel sources to generate the needed BTU value of the output. For instance, if MSW is in limited supply, the operator can select other available fuels, and through our control system, calculate the necessary output by including different volumes of other ingredients, or combinations of those fuels.

Fuel source	BTUs / lb	BTUs / ton
MSW	4,000	8,000,000
Waste coal (3% sulfur content)	6,500	13,000,000
Wood	8,000	16,000,000
Crops, - corn or sugarcane (bagasse)	8,500	17,000,000
Tires	16,000	32,000,000

When people ask about the emissions, or the safety of burning hazardous materials, they most often ask about dioxins and furans, nitrogen oxides or NOx, or things like medical waste. Again, the response to how this process does not produce any harmful emissions deals with the temperature. Our standard operating temperature range is between 1,800°F and 2,200°F, with typical temperature at 2,000°F.

1. Dioxins and furans are only produced at temperatures between 200°C and 450°C, or 392°F and 842°F.
2. NOx can only be produced at temperatures above 1,700°K, or 2,600°F (1,426°C).
3. According to the US EPA, the temperature needed to properly destroy pathogens and biologically active materials is between 1,800°F and 2,200°F (982°C and 1,204°C). This is our exact operating temperature, with the average of 2,000°F (1,093°C).

Putting it more simply, we are too hot to produce dioxins, too cold to produce NOx, but just right to destroy harmful materials. In addition, since we add excess air to our process, the exhaust also contains O_2 and N_2. The exhaust is made up of the following percentages:

CO_2 = 6.979 % VOL
H_2O = 13.958 % VOL
O_2 = 5.583 % VOL
N_2 = 73.478 % VOL

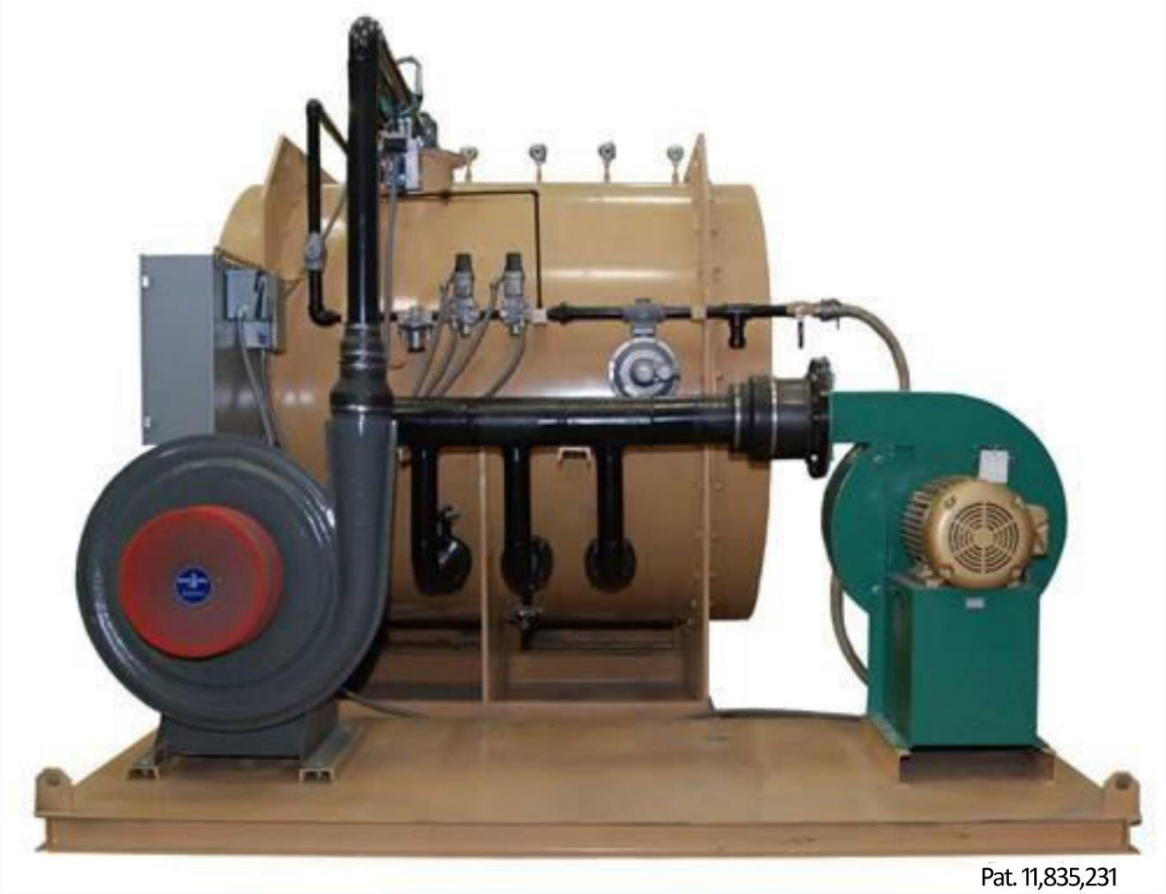
Finally, one of the most important features of our technology is with our ability to achieve this harmonic balance within our process. In conventional technologies, external exhaust scrubbers are used to take the exhaust from a combustion system, and by burning it off through a complete combustion process, they break down the materials in the gases, and produce a clean output. Considering that our technology already incorporates this method internally, essentially we are doing an "exhaust scrubbing" even before it's allowed to enter the flue pipe and go out into the atmosphere.

THERMOMAX™

Thermogenic Maximum Eco Waste Destroyer

***Thermo*MAX3™ - 3 ton per hour vortex unit (MAX3™ for short)**

***Thermo*MAX6™ - 6 ton per hour vortex unit (MAX6™ for short)**



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Sideview of our *Thermo*MAX3™

General notes and thoughts regarding combustion, gasification, and the science behind our technology

THERMOMAX™
Thermogenic Maximum Eco Waste Destroyer™

Following are general concepts and descriptions of the patented ***Thermo*MAX™** Thermal Vortex technology.

Definitions:

1. Biomass
   Biomass: is biological material from living, or recently living organisms. As an energy source, biomass can either be used directly, or converted into other energy products such as biofuel, or various types of feedstock for boilers. Included is yard waste, agricultural crop waste, and woody biomass. The term biomass is often used to describe municipal solid waste (MSW), although technically with paper, plastics, and other non-organic materials, it doesn't apply.
2. Combustion
   Combustion: Combustion takes place when fuel, most commonly a fossil fuel, reacts with the oxygen in air to produce heat. The heat created by the burning of a fossil fuel is used in the operation of equipment such as boilers, furnaces, kilns, and engines. ***Along with heat, CO_2 (carbon dioxide) and H_20 (water vapor) are created as byproducts of the exothermic reaction.*** Complete combustion occurs when all of the energy in the fuel being burned is extracted and none of the Carbon and Hydrogen compounds are left unburned. Complete combustion will occur when the proper amounts of fuel and air (fuel/air ratio) are mixed for the correct amount of time under the appropriate conditions of turbulence and temperature. This is also known as stoichiometric combustion… considered to be an ideal of performance, but often not achievable using conventional methods.

Three primary factors for combustion:

1. ***Time*** – also referred to as residence time. The longer waste material remains in the burning cycle, the more efficient the burning process. Our technology uses a patented process to reintroduce waste material back into the vortex to create a virtually infinite burning time, thereby not allowing any ash material to remain.
2. ***Turbulence*** – this concept is also used in convection ovens to increase efficiency. Our technology uses a 90 mph vortex (tornado on its side) offering the most turbulence possible inside the chamber.
3. ***Temperature*** – Our temperature range is between 1,800°F and 2,200°F, with an average of 2,000°F. This is also the required temperature according to the US EPA to destroy pathogens and biologically active materials.

Although theoretically, stoichiometric combustion provides the perfect fuel to air ratio, which thus lowers losses and extracts all of the energy from the fuel; in reality, stoichiometric combustion is unattainable due to many varying factors. Heat losses are inevitable thus making 100% efficiency impossible. We achieve a 99.998% combustion rate, as close to stoichiometric combustion as possible to achieve at this time. Our chamber also has a 98% thermal efficiency, compared to a typical efficiency of only 60 to 65% found in current technologies and conventional furnaces or boilers.

In practice, in order to achieve complete combustion, it is necessary to increase the amounts of air to the combustion process to ensure the burning of all of the fuel. The amount of air that must be added to make certain all energy is retrieved is known as excess air. In most current-technology combustion processes, additional chemicals are formed during the combustion reactions. Some of the products created such as CO (carbon monoxide), NO (nitric oxide), NO_2 (nitrogen dioxide), SO_2 (sulfur dioxide), soot, and ash should be minimized and accurately measured. The EPA has set

specific standards and regulations for emissions of some of these products, as they are harmful to the environment. This is what separates our technology from conventional methods, in that we don't produce those harmful emissions due to our unique design and process.

As the material burns in full suspension inside the 90 mph free-standing vortex, it moves very quickly to the back wall, where, through a patented process, all of the remaining unburned material, including microscopic dust, is reintroduced back into the vortex for a continuous burning cycle. This extended residence time and the design of the exhaust outlet, results in not allowing any unburned material, also known as fly ash, to exit into the atmosphere.

Because of the complete and perfect combustion, combined with the high temperatures, high level of turbulence, and the unique internal design characteristics, this technology offers a clean, pollution-free method of destroying a variety of waste materials quickly and at significant volumes. This is another very important distinction between the *Thermo*MAX™ and a conventional incinerator, in that we are able to achieve complete and perfect combustion and incinerators are only able to reach incomplete combustion due to the inability to control the ratio of air, waste, and fuel.

Comparisons of the technologies – a good analogy might be the multi-step process of woody biomass in which current technologies simply take the wood chips, and process them into wood pellets that then have to be burned in a pellet burning stove… gasification produces syngas, whereas combustion produces heat as one of the products.

Gasification is a process that converts carbonaceous materials, such as coal, petroleum, biofuel, or biomass, into carbon monoxide and hydrogen by reacting the raw material, such as house waste, or compost at high temperatures with a controlled amount of oxygen and/or steam. The resulting gas mixture is called synthesis gas or syngas and is itself a fuel. Gasification is a method for extracting energy from many different types of organic materials.

For example, using coal as a fuel source, in a gasifier, the carbonaceous material undergoes several different processes:

1. The **pyrolysis** (or devolatilization) phase occurs as the carbonaceous particle heats up. Volatiles are released and char is produced, resulting in up to 70% weight loss for coal.
2. The **combustion** phase occurs as the volatile products and some of the char reacts with oxygen to form carbon dioxide and carbon monoxide, which provides heat for the subsequent gasification reactions.
3. The **gasification** phase occurs as the char reacts with carbon dioxide and steam to produce carbon monoxide and hydrogen, which is the syngas used as a fuel. Note that no heat is produced as it is in other combustion methods.

What makes us unique is our innovative blending of multiple proven processes. We refer to this as Synergistic Iteration.

- Synergy: the interaction of elements that when combined produce a total effect that is greater than the sum of the individual elements, contributions, etc…
- Iteration: the act of repeating a process with the aim of approaching a desired goal, target or result.

Two phases of our waste transformation process:

1. Initial destruction / transformation / conversion phase … this is the Synergy part
2. Secondary exhaust scrubber phase… this is the Iteration part

We are also able to offer a process known as CCS, or carbon capture and sequestration. This is where CO_2 is extracted from the exhaust and repurposed, typically by commercial growers and commercial greenhouses. What makes us unique here is that for most large power plants, the technology used is very complex and even has to be built underground. Our method uses a material called monoethanolamine, or MEA. In a simple description, we pass the exhaust through this aqueous material, where it is later heated up to boiling. The only resulting byproduct is CO_2. This can be extracted and stored in large tanks.

We generally get a variety of questions, since this technology in essence, offers something unique to most people, even though many the concepts such as complete combustion, and the potential to blend various methods has been around for many decades. These are the two most common questions:

Is this incineration? This is one of my favorite questions. Incinerators are old technologies, and typically built as a quick and relatively low-cost method of destroying waste materials. But our system uses proven design concepts, and blends various technologies together to offer a much more efficient, and even lower cost solution. In fact, we are closer to being an exhaust scrubber than anything else. With the process of our *Thermo*MAX™ technology, the waste material doesn't rest on a grate, and doesn't smolder. Conventional combustion methods also require a constant external fuel source, whereas ours only uses an external fuel to initiate the process, and is turned off after only a few minutes, as the waste material becomes its own fuel.

What about harmful emissions? As we have described, our technology burns the waste material while fully suspended in the high-speed vortex, and not resting on a grate. Since virtually all of the potentially harmful emissions are created during incomplete combustion, and since our process is easily able to achieve complete combustion, none of the usual harmful elements are formed. Combustion is a chemical process, so perhaps it would be easier to understand that what we are doing is *transforming* the waste materials from their original solid state into various gases. Again, due to the internal process and design, as well as achieving complete combustion, we never create those harmful emissions in the first place.

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