Scrap Tire Disposal

Vortex Energy Group LLC
www.VortexEnergyGroup.com

We have to stop this...

This is our solution...

***Energy*... our process takes old, discarded tires and turns them into electricity!**

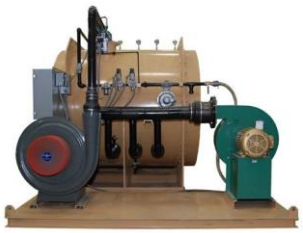
VORTEX
ENERGY GROUP LLC

pegasus
ENERGY

A Guide to Tire Disposal Using Thermal Vortex Technology

Our *"Did You Know?"* Series

As part of our "Did You Know" series, we are offering this detailed description of our latest *Thermo*MAX™ technology, for specific applications. To learn more about vortex combustion, you can read our Guide to Thermal Vortex Technology, or other documents in this series, available online at www.VortexEnergyGroup.com.



Pat. 11.835,231

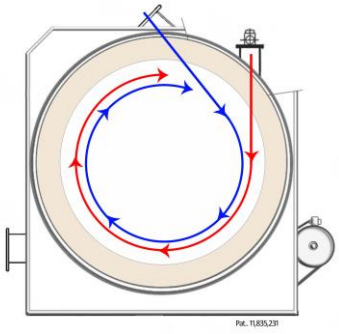
General Description

The *Thermo*MAX™ is a grateless combustor that uses high temperatures (2,000^{o} F and above) with high speeds (a 90 mph tornado on its side) to more efficiently burn shredded waste material, in this case, old scrapped tires. This material then moves through the chamber towards the back wall, where (through a patented and proprietary method) it is re-introduced back into the vortex for continuous burning.

This overall process is known as "synergistic iteration." As the waste material burns in suspension, it becomes its own fuel, mixing with controlled amounts of air (oxygen) to achieve ***complete and perfect combustion***. Current technology systems allow the waste to sit or rest on a grate while burning, which produces the harmful emissions, gases, fly ash, and smoke, because of incomplete combustion. These require expensive and complex air scrubbers to remove the contaminants prior to entering the atmosphere. The *Thermo*MAX™ does not produce these same harmful outputs, and therefore does not require exhaust cleaning or scrubbing.

Details

The tires are fed into a shredder, then move through a material handling manifold with the help of a fan supplying the primary air for the combustion chamber. This mixture of air and shredded tires is introduced into the chamber tangentially, which follows the contour of the chamber, and is blended with the motion and direction of the vortex flame, as shown with the blue curved line in the image to the left. This process now creates a super-heated vortex which burns the shredded tire material while fully in suspension. To achieve complete and perfect



combustion, it is necessary to control the mixture of the waste, fuel, and oxygen. Turbulence is also a critical factor, which in this case comes about with the high-speed vortex rather than a shaker-grate as some combustors use. Additionally, as the waste material is moving through the chamber, it is not only reducing in size, but becomes fuel for the process, which allows for a higher level of combustion and efficiency.

Some materials that are non-combustible are drawn out into a cyclone separator during this process. Non-combustibles encountered in this tire disposal process would be the steel belts and other reinforcing materials. With the vortex combustion, these non-combustibles become sterile and neutralized, and perfectly safe for handling and proper disposal. The extremely hot air gas that exits during this process is reintroduced back upstream into the vortex to be burned off, as in the process of a manufacturing fume burner. This super-heated air acts to enhance the overall speed and temperature of the existing vortex, improving its efficiency.

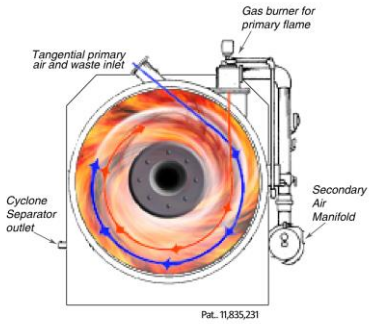
Did You Know…?
… that combustion has been used as a means of waste management since the 1800's?

The *Thermo*MAX™ has been designed with state-of-the-art programmable logic controllers (PLCs) for automation processing. It's also equipped with an array of sensors which allow complete and accurate control and monitoring of numerous factors, such as vortex temperature, vortex speed, secondary air dampers, and the air quality contained in the exhaust stack. The system is equipped with EPA-approved monitoring software, with remote access capability to provide continuous transmission of the data collected and reports directly to the state environmental protection agency, and local public works managers.

Did You Know…?
… that in addition to being part of our breathing process, CO_2 is used for adding carbonation to sodas, and in the making of wine?

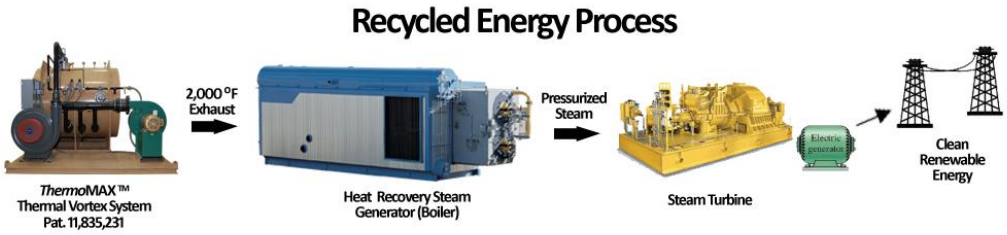
With complete and perfect combustion, the only by-products are CO_2 and H_2O. No harmful emissions, gases, fly ash, odors, or even smoke, are produced through the process of this vortex combustion, therefore no scrubber systems are needed. The exhaust that is released into the atmosphere is clean and harmless, far exceeding EPA air quality specifications and standards. Because this process doesn't allow for waste to sit or to collect, as well as not having soot or other messy residue build-up, there is very little maintenance required as found with current technology systems.

One of the most unique features of this technology is the high speed vortex. No other combustion system takes advantage of the efficiency that this offers, compared to standard combustors that use fixed or even shaker grates, or multiple chambers. With the use of a "free vortex" in combination with the high temperatures, and no need for the exhaust scrubber systems, the output temperature in the exhaust stack stays consistently around 2,000 ^{o} F.



This system can be used as part of a waste-to-energy (WtE) system, where the super-heated exhaust can be directed to a heat recovery steam generator, or boiler, and then to a steam turbine for the production of electricity. By processing shredded tire material, which burns at 4 times the BTU rating of standard municipal solid waste, energy is produced more efficiently

than other technologies that create oils and fuels from tires. This system can easily handle shredded tires on a continuous rate, which will generate an impressive capacity of electricity.



This energy recapture process has been used for decades in this country, as well as all around the world. In each case, there is always a boiler and a steam turbine, but the combustion source can vary based on specific needs. Other combustion sources include jet engines, natural gas / coal fired / wood burning furnaces. Combustors are used, but because of the need with current technologies to have exhaust scrubbers that reduce output temperatures, they aren't as efficient as other sources.

Did You Know…?
… that only one *Thermo*MAX™ system with energy recapture can generate more electricity than 4 large wind turbines?

Without getting into technical electricity distribution and transmission concepts, the process once the electricity is generated from the steam turbine, is handled by the electric utilities. The electrical output is purchased by the utilities, and distributed into the grid as necessary. The power that is generated at one site may not be used in the same geographic region, but could be transmitted several states away.

The use of steam turbines in energy production has been going on in some form for more than 125 years. In fact, 80% of the electricity generated in the world is with the use of steam turbines. With the low cost of the *Thermo*MAX™, in combination with commercially available boilers and steam turbines, this process is one of the lowest costs methods available today.

Summary

The *Thermo*MAX ™ offers a high level of efficiency through the unique blending of extreme temperatures and high speeds, along with a patented process of reintroduction of particulate matter for continuous burning to achieve complete and perfect combustion. Because of this process, the system does not produce harmful emissions and gases, odors, fly ash, or smoke. With a small footprint, this system can be installed closer to populated areas, and offers a unique, modular design for rapid replacement or modification. The *Thermo*MAX™ can also be used as an eco-friendly solution for mobile needs, and can also be configured with smaller boiler/steam turbine combinations to produce electricity on a temporary basis.

In the U.S., we dispose of more than 300 million tires each year, which is approximately one for each man, woman, and child in this country. No other technology today has the capacity, low cost, or environmental benefits that the *Thermo*MAX ™ Thermal Vortex System offers. Not only will the use of this system be able to resolve the decades-old problem of getting rid of tires, it will prevent potential environmental impacts normally found in landfills, uncontrolled tire fires, and other forms of disposal, and it will produce an abundant amount of energy, which will help us in our goal of energy independence.

Scrapped or discarded tires in the United States

How many tires are discarded each year in the U.S.?

In the United States, it's estimated that approximately 300 million tires are discarded each year. This figure can vary slightly from year to year due to changes in vehicle ownership, tire lifespan, and recycling practices. A significant portion of these discarded tires are recycled or repurposed, but many still end up in landfills or are illegally dumped, posing environmental and health risks.

What percentage of discarded or scrap tires are actually recycled or repurposed?

Approximately 75-80% of discarded or scrap tires in the United States are recycled or repurposed. This includes uses in various applications such as ground rubber products, tire-derived fuel, civil engineering projects, and other innovative uses. The remaining percentage typically ends up in landfills, stockpiled, or illegally dumped. The high recycling rate is a result of concerted efforts to manage scrap tires in environmentally responsible ways.

What is the volume of truck tires discarded each year in the U.S.?

In the United States, an estimated 33 million truck tires are discarded annually. This figure is part of the overall total of approximately 300 million tires discarded each year, which includes passenger vehicle tires, truck tires, and other types of tires. Truck tires, being generally larger and more durable, are a significant component of the total volume of discarded tires.

What is the volume of NASCAR or Indy Car Racing tires discarded each year?

Each year, NASCAR and IndyCar races result in the discard of a significant number of tires, although this volume is much smaller compared to passenger and truck tires.

For NASCAR, it is estimated that around 30,000 tires are used and discarded each year. This includes tires used in races, practices, and testing sessions.

IndyCar racing, which has a shorter season and fewer races, discards fewer tires, typically in the range of 5,000 to 10,000 tires annually.

These racing tires are often recycled or repurposed, as they are replaced frequently to ensure optimal performance and safety during races.

What is the average weight of a passenger car tire? What is the average weight of a truck tire? What is the average weight of a NASCAR or Indy Car Racing tire?

The average weight of different types of tires varies significantly based on their intended use and design. Here are the approximate average weights:

1. **Passenger Car Tire:** The average weight of a passenger car tire ranges from 20 to 25 pounds (9 to 11 kg), or an average of 22.5lbs each.
2. **Truck Tire:** The weight of truck tires can vary widely, but on average, a standard commercial truck tire weighs between 100 and 120 pounds (45 to 54 kg) or an average of 110 lbs each. Some larger truck tires, particularly those used on heavy-duty trucks, can weigh significantly more.
3. **NASCAR or Indy Car Racing Tire:** Racing tires are specially designed for high performance and vary based on the type of racing and specific series. For NASCAR, the average weight of a tire is approximately 24 to 27 pounds (11 to 12 kg). IndyCar tires are lighter, with an average weight around 18 to 22 pounds (8 to 10 kg). We will use an average of 25.5 lbs each. The differences in weight are due to the specific requirements for grip, durability, and speed in racing conditions.

Stockpiled tires:

There are currently around 80 million tires that are stockpiled in the U.S. This number has been decreasing over the past few years as they are processed by either recycling or repurposing the rubber material. 80 million tires using only the weight of passenger vehicle tires of 22.5 lbs/tire, we have roughly 900,000 tons of tires available.

By the numbers:

Using the numbers and weights above, we can divide the potential volume of scrapped tires and their potential market value.

1. Passenger tires
   With 267 million passenger tires scrapped or disposed of each year, with an average weight of 22.5 lbs/each (6,007,500,000 lbs or 3,003,750 tons), and using 16,000 BTUs/lb, processing 2 tons per hour (64,000,000 BTUs needed ÷16,000 = 4,000 lbs ÷ 2,000 lbs/ton = 2 tons/hr), and 2 tons/hour X 24 hours/day X 365 days/year, we would get 17,520 tons per year. 3,003,750 tons ÷ 17,520 tons per year would give us **171 WtE systems**.

2. Truck tires
   With 33 million truck tires scrapped or disposed of each year, with an average weight of 110 lbs/each (3,630,000,000 lbs or 1,815,000 tons) and using 16,000 BTUs/lb, processing 2 tons per hour (64,000,000 BTUs needed ÷ 16,000 = 4,000 lbs ÷ 2,000 lbs/ton = 2 tons/hr), and 2 tons/hour X 24 hours/day X 365 days/year, we would get 17,520 tons per year. 1,815,000 tons ÷ 17,520 tons per year would give us **104 WtE systems**.

3. NASCAR / Indy Car racing tires
   With 40,000 racing tires scrapped or disposed of each year, with an average weight of 25.5 lbs/each (765,000 lbs or 383 tons) and using 16,000 BTUs/lb, processing 2 tons per hour (64,000,000 BTUs needed ÷ 16,000 = 4,000 lbs ÷ 2,000 lbs/ton = 2 tons/hr), and 2 tons/hour X 24 hours/day X 365 days/year, we would get 17,520 tons per year. 511 tons ÷ 17,520 tons per year would give us 1 WtE system for 3 months!

   171 + 104 = 275 WtE systems per year.

   275 WtE systems times $11,157,250 give a market potential of **$3,068,243,750 or $3 billiion**.

4. Stockpiled tires
   With 900,000 tons currently stockpiled in the U.S., we would have the same 16,000 BTUs/lb. Processing 2 tons per hour (64,000,000 BTUs needed ÷ 16,000 = 4,000 lbs ÷ 2,000 lbs/ton = 2 tons/hr), and 2 tons/hour X 24 hours/day X 365 days/year, we would get 17,520 tons per year. 900,000 tons ÷ 17,520 tons per year would give us 51 WtE systems.

   51 WtE systems times $11,157,250 give a market potential of **$569,019,750 or $569 million**.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