The Solid Fuel Burner

The **Onix** Corporation is on the cutting edge of technology with its research on solid fuel. This research resulted in the development of The **ONIX** Series Solid Fuel Burners.

These burners operate primarily on reclaimed wood, bringing the fuel cost to a minimum. Depending on the availability of in-house waste such as poly tailings, sawdust, etc., consumers may experience a negative fuel cost.

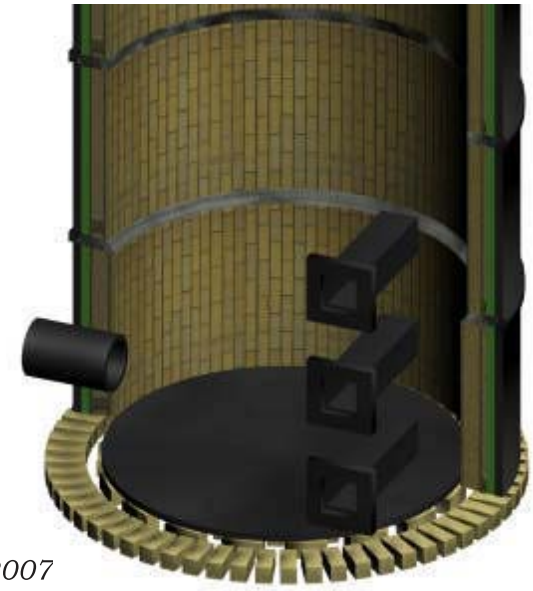
These burners are capable of delivering between 0.5 MM and 150 MM Btu's per hour and can achieve temperatures of 2,000 degrees Fahrenheit while saving money on every Btu used.

The **Onix** Corporation's **ONIX** Series solid fuel burners have many industrial applications including replacing outmoded burners, dryer heat source, heat for kilns, heat source for boilers, as well as winter space heating.

The **Onix** Corporation prides itself on meeting or exceeding local, state, and federal air quality standards. Our emissions contain virtually no sulfur, NOx, or CO.

20 MM Btu/hr solid fuel burner for a drying system. Drying system retains capability of using natural gas as a fuel.

There are over 100 **ONIX** Series solid fuel burners presently in operation world wide providing millions of Btu's for a fraction of previous fuel costs. These burners can be operated on a number of recovered co-products of manufacturing, which represent an additional expenses to a company currently discarding the co-products.



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Cyclonic Combustion

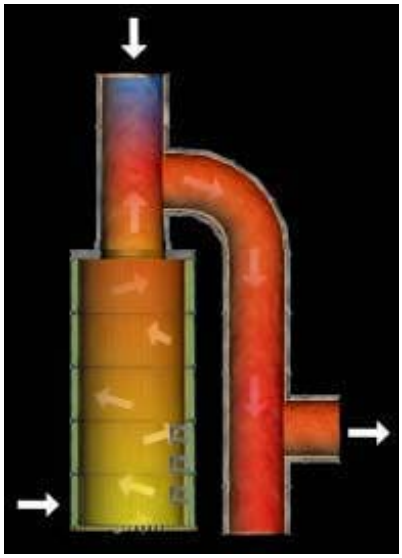
How it works

Cyclonic furnaces have become a major alternative to conventional burners. Applications include both large-scale utility boilers and certain industrial processes where waste heat can be recovered profitably.

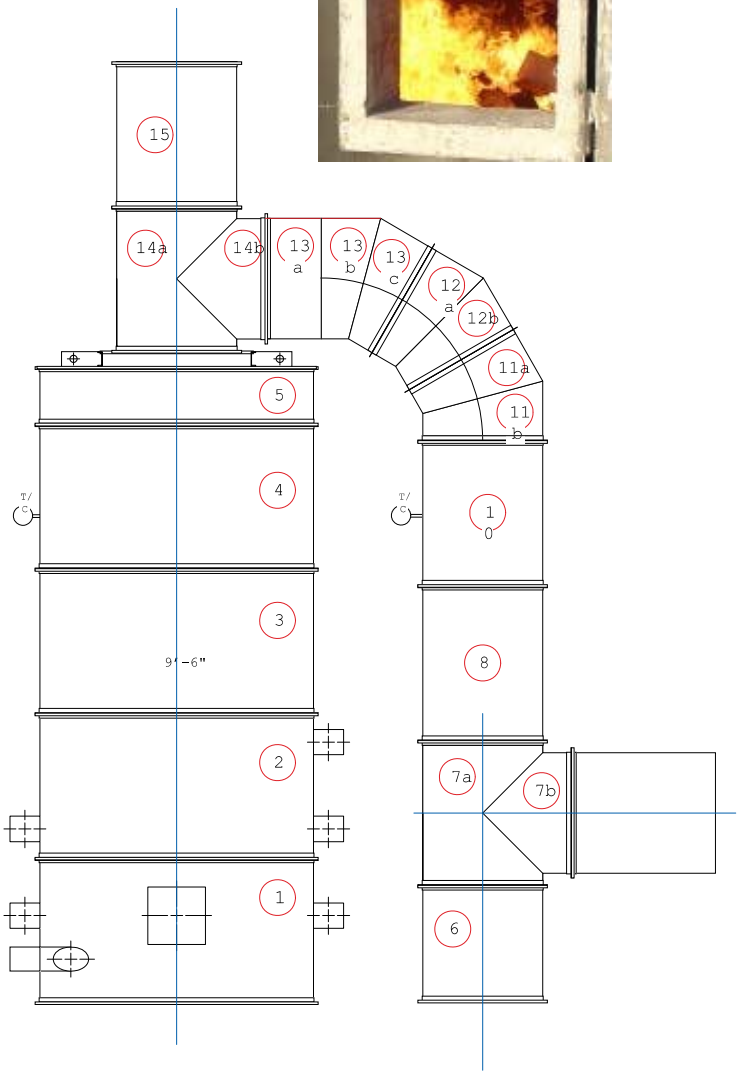
The **ONIX** Series solid fuel burner is operated by cyclonic combustion. In cyclonic combustion, the burning occurs at a positive pressure, rather than the slight negative pressure associated with most suspension fired wood systems.

The combustion occurs in a specially designed cylindrical reactor which discharges hot gaseous combustion products directly into the boiler or other vessels. Pulverized wood is blown into the cyclonic burner where it oxidizes immediately. Centrifugal action forces the particles toward the cylindrical wall of the burner where char oxidation occurs. Very high turbulence is generated in the cyclonic burner and char oxidation occurs within milliseconds.

Combustion intensity in cyclonic burners is considerably higher than combustion intensity in conventional wood suspension fired furnaces.



The vigor of the cyclonic action forces the wood particles to the burner wall, facilitating not only rapid combustion but also solid product removal. Cyclonic burners typically remove 99% of the solid products of combustion. These solid products of combustion exit the burner then enter the boiler or other vessels and are removed as fly ash by a particulate control system.



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ROTARY DRUM DRYERS • ALTERNATIVE FUEL SYSTEMS

SYSTEM FUNCTION

Cyclonic Solid Fuel Burner

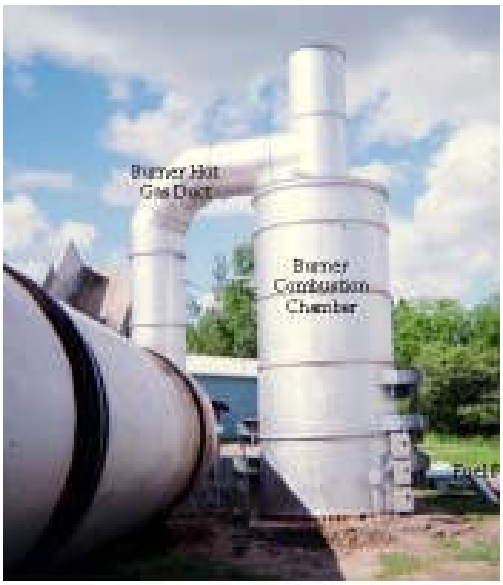
—-A Type "K" thermocouple at the dryer discharge senses an energy demand. Three things happen simultaneously :

1. Fuel feed rate increases.
2. The additional fuel creates an energy increase in the burner; this energy is drawn into the drum by the dryer i.d. fan.
3. The dryer outlet temperature is increased.

—-Wood fuel fires very clean in the burner. If burner emissions from the propane combustion or dried sawdust are exhausted directly from the combustion chamber to atmosphere, only heat waves are visible. There is no smoke, no malodor, and virtually no CO and VOC's. The combustion process is extremely hot and exceptionally clean.

—-Dried fuel is delivered to The **Onix** Corporation feeding equipment. This variable speed feeding equipment is capable of delivering material to the burner at continuous rates from 1 to 100 ft.^{3}/hr.

—-The entire system is automatic and basically labor free, with 100% automatic fuel feed to exact dryer needs.



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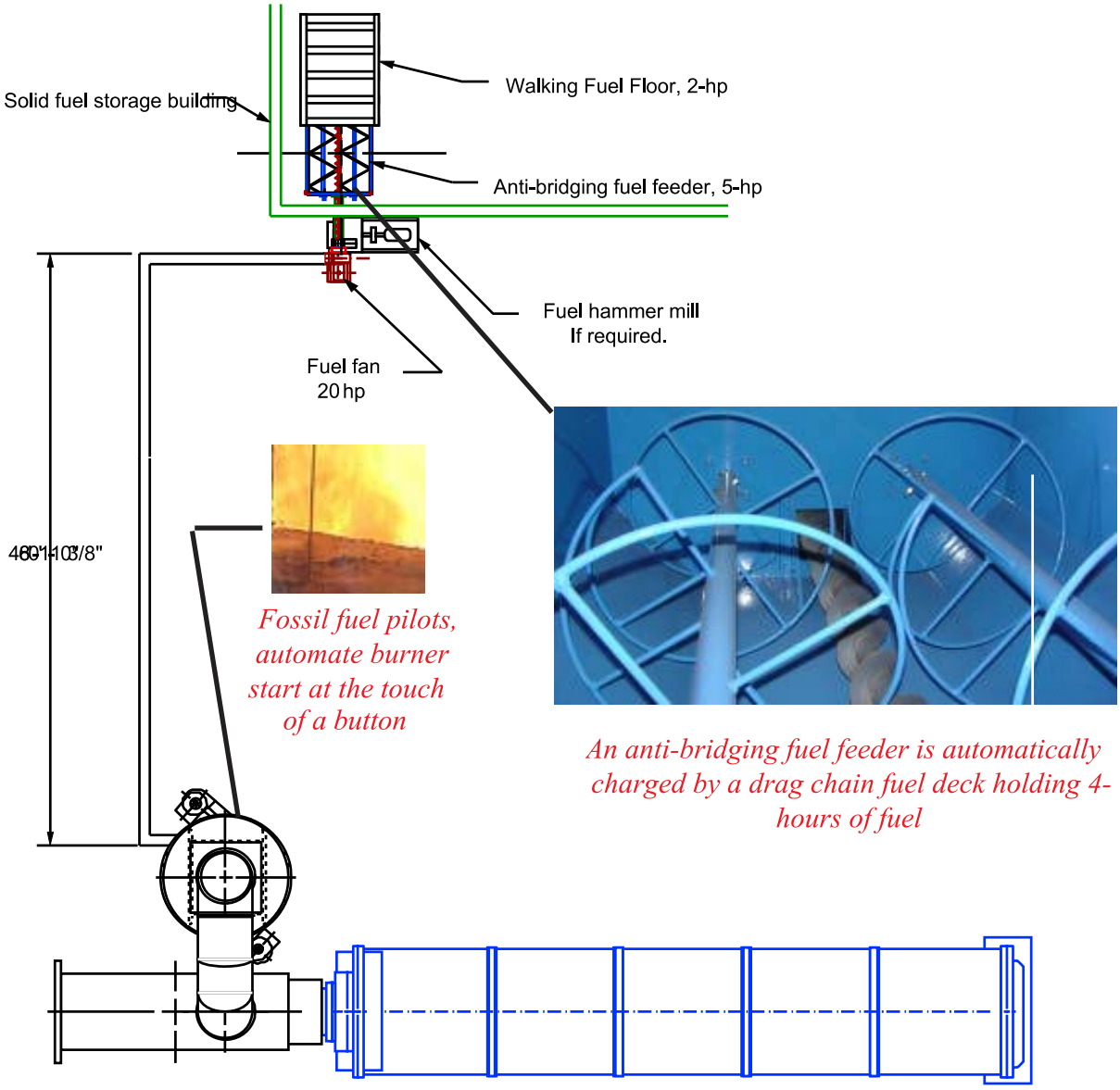
Onix – Fuel Delivery

All units are priced to include 4-hours of fuel storage through incorpora - tion of a top loading fuel deck. Tank feed systems can be substituted.

The Onix Corporation

26 MM Btu/hr Solid Fuel Burner

Typical Feeding Arrangement



Fossil fuel pilots, automate burner start at the touch of a button

An anti-bridging fuel feeder is automatically charged by a drag chain fuel deck holding 4-hours of fuel

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Onix Installation

All units are priced to include installation within the continental US
(excluding fuel piping and motor wiring).
All pieces are pre-lined with refractory to speed up mechanical installation time to 1-day.

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Onix Controls

Control packages integrated with the Onix-OS©.

Real-time data displayed on a secure web page allows you to view your company's dryer data from your LAN or internet connection. Integrated security cameras will allow you to watch the dryer operation from afar.

The Onix-OS©

Solid Fuel Burner Overview Screen

Solid Fuel Burner Data

Burner System Faulted

Control -- Burner Loop

Burner Temperature	1,540
Burner Set point	1,540
Burner Fuel Valve Output %	24

Auto Manual

Auto/Man

Burner Ignition Failure

Burner Temperature	1,540
Combustion Air Ratio	10:0
Combustion Air Output %	16

M-1 CAF#1	M-2 CAF#2	M-3 CAF#3	M-4 CAF#4	M-5 CAF#5	M-6 Fuel Fan	M-7 Fuel Hammer mill	M-8 Fuel Auger VFD

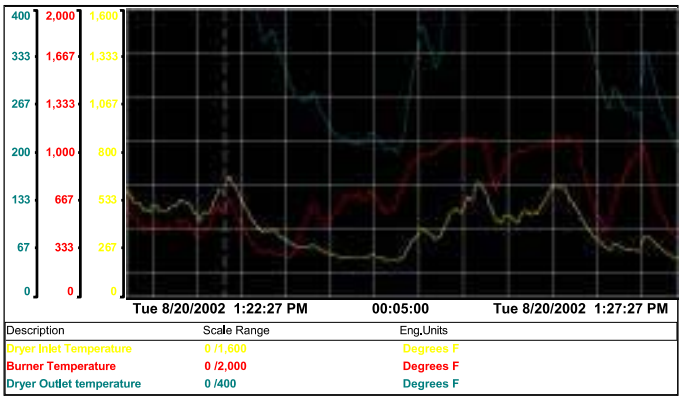
Burner 30 Second Stop

System E-Stop Pressed

Burner Immediate Stop

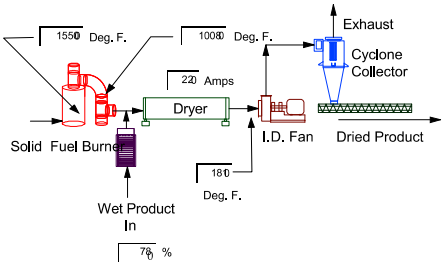
Burner Auto Start

Dryer System Overview



Description	Scale Range	Eng.Units
Dryer Inlet Temperature	0 /1,600	Degrees F
Burner Temperature	0 /2,000	Degrees F
Dryer Outlet temperature	0 /400	Degrees F

Drying Process Screen



Rotary Dryer Data

Dryer Amps	22
Dryer Inlet Temperature	1000
Dryer Outlet Temperature	181
Dryer Outlet Set point	180
Fuel Valve Output %	62

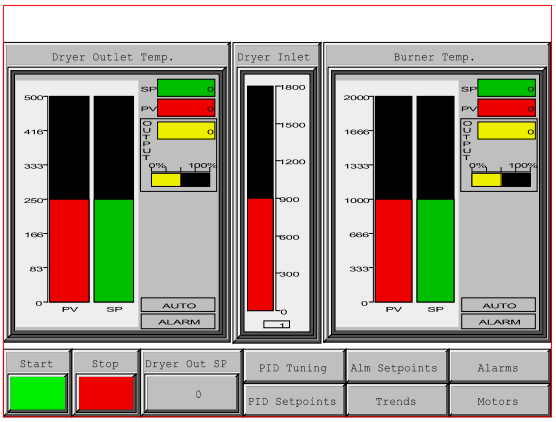
Auto

Auto Man

Wet Product Feeder VFD Output %	70

Wet Product Feeder VFD Start/Stop

Dryer Feed Directed to Dryer Stockpile



Dryer 30 Second Stop

Dryer Cleanout and Shutdown

Dryer Immediate Stop

Dryer Auto Start

Dryer Trends

Motors

System Overview

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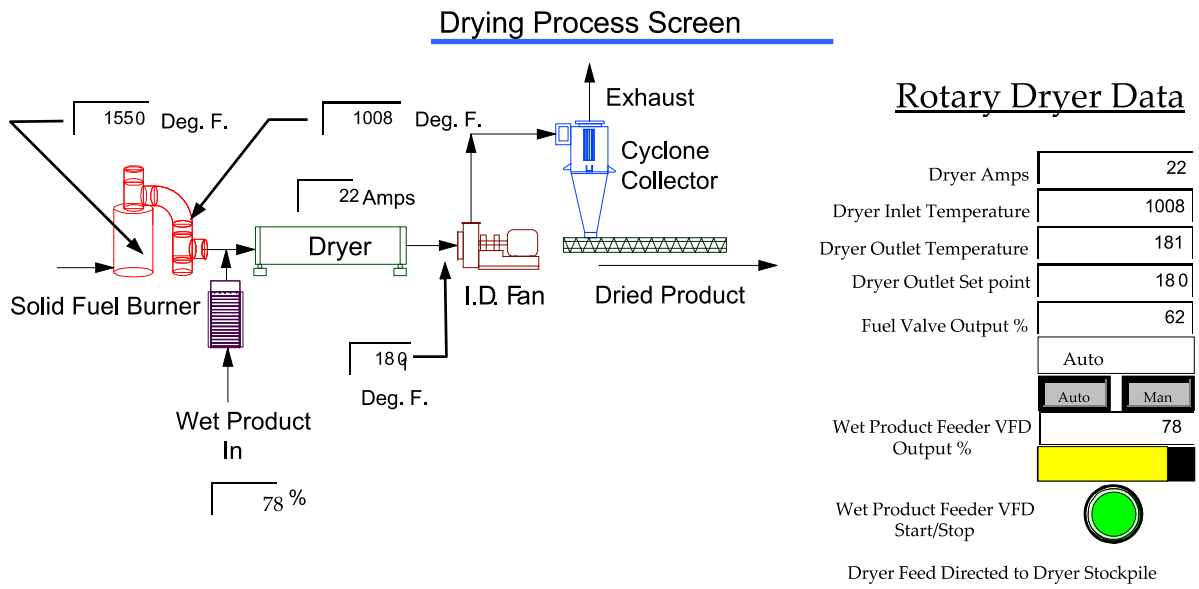
Onix OS©

The system features Allen Bradley/Entivity/Automation Direct Touch Screen controls. This degree of control allows for automatic and manual control. Controls will display fuel consumption in pounds per hour. The controls monitor dryer inlet and outlet temperatures and cause system safety shut-down in case of extremes. This level of automation offers burner trial for ignition at the touch of a button and a comprehensive operator 10" touch screen display for all dryer functions controlled. A networked PC will historically track burner and dryer temperatures and all operator settings. An alarm screen on the touch screen will track alarm history. A modem connected to the PLC/PC allows for remote adjustment and troubleshooting of the PLC/PC program via phone or internet. Technical support is only a few mouse clicks away. Future expansion of this program is possible to include all dryer functions.

The graphic below presents an example of what the operator might see during system operation. The Onix-OS© also historically tracks dryer inlet, outlet and burner temperatures indefinitely. The Onix OS© can be upgraded to control all plant functions at anytime in the future or to display integrated existing values present, within the plant. The Onix-OS© can be remotely monitored or accessed via telephone or internet, which then permits interaction with control and trend screens.

Plant operators have a rugged 10" NEMA-4 touch screen interface to access all burner functions. Burner faults and alarms are tracked and recorded with a time and date stamp. This system integrates stopping of the wet product feeder and dryer i.d. fan in an ultimate high alarm condition.



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Onix OS ©

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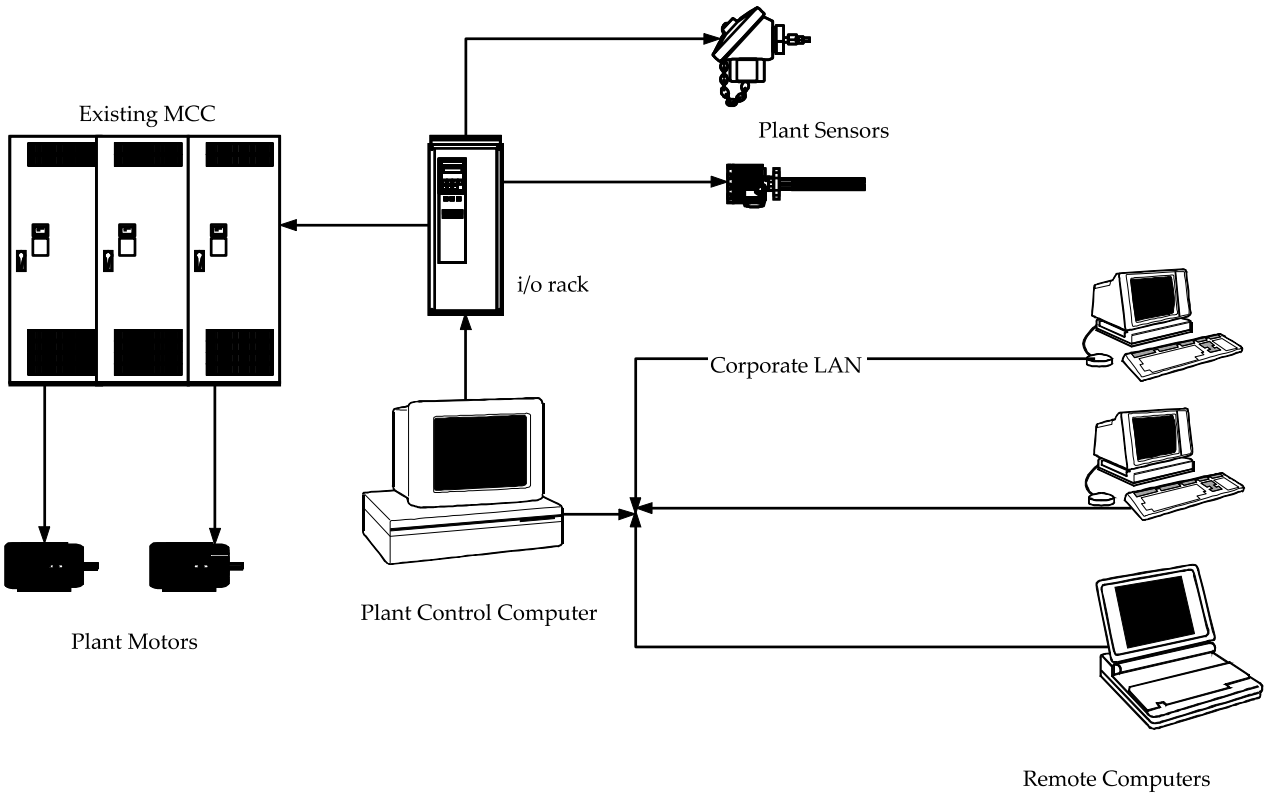
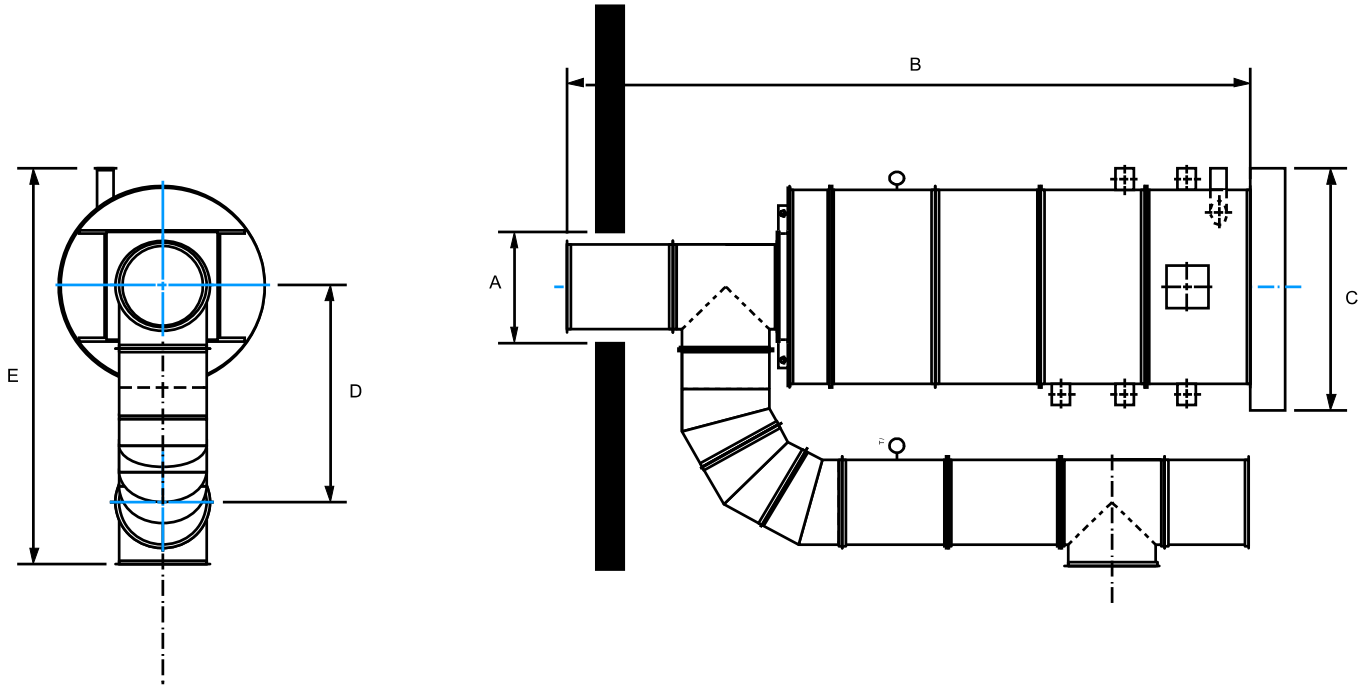
The Onix-OS© boasts up to 64 PID loops having, for all practical purposes, no limit to the number of burners or system components which it can control. This system has touch-screen control and is capable of automatically tracking historical trends and data archiving. The Onix-OS© can start and control all the motors at your plant, not just the dryer motors. The Onix-OS© allows authorized plant personnel to dial into the system to retrieve data on plant operation during the night, the past week or years back. It can track any parameter and inform when and why the system shuts down due to any alarm extreme. Reports can be generated to outline plant wide production during any selected time interval. The Onix-OS© can be modified to add motors or data items from a remote computer. This system will require the presence of an operator at start-up and



The Onix Corporation

ROTARY DRUM DRYERS • ALTERNATIVE FUEL SYSTEMS

Solid Fuel System Dimensions



Model Number	A	B	C	D	E	HP
ON-02	24	125	64	68	109	20 hp
ON-04	24	152	75	68	120	40 hp
ON-05	26	162	79	71	127	40 hp
ON-10	33	198	93	81	152	45 hp
ON-12	45	213	98	100	175	50 hp
ON-20	59	248	112	122	210	55 hp
ON-26	59	268	122	123	220	55 hp
ON-30	59	280	127	123	224	55 hp
ON-45	82	330	142	158	274	75 hp
ON-52	82	344	148	158	280	80 hp
ON-60	82	359	154	158	286	85 hp
ON-75	91	384	166	173	310	100 hp

All dimensions are in inches and are approximations contingent on approval drawing release
The number after the ON- indicates the burner maximum output in Millions of Btu/hr

P.O. Box 270_71Main Street--Caribou, ME 04736 * 800-844-0076 Phone * 207-496-3253 Intl. Phone -- 207-496-3743 FAX
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ROTARY DRUM DRYERS • ALTERNATIVE FUEL SYSTEMS

Model Number	App. Horsepower	Maximum Energy Output
ON 02	20hp	**2 MM Btu/hr**
ON-04	40hp	**4 MM Btu/hr**
ON-05	40hp	**5 MM Btu/hr**
ON-10	45hp	**10 MM Btu/hr**
ON-12	50hp	**12 MM Btu/hr**
ON-20	55hp	**20 MM Btu/hr**
ON-26	55hp	**26 MM Btu/hr**
ON-30	55hp	**30 MM Btu/hr**
ON-45	75hp	**45 MM Btu/hr**
ON-52	85hp	**52 MM Btu/hr**
ON-60	90hp	**60 MM Btu/hr**
ON-75	100hp	**75 MM Btu/hr**

- Complete solid fuel burner packages included anti-bridging fuel feeder with 4 hours of fuel storage for top loading, tank feed system may be substituted.

- All solid fuel burners have customer choice of gas, propane or #2 fuel oil fossil fuel pilot

- All programs must undergo a thermodynamic analysis by The **Onix** Corporation to assure program viability and price.

- All system components have a three-year warranty full replacement.

- Horsepower requirements are approximations. Price includes a fuel hammer mill for on line size reduction for 1" maximum lump size.

- All systems include PLC/ PC for system control interface, data tracking and network wide control. Internet viewing of system is available with applicable internet connection.

- All prices are in U.S. Dollars

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A Breath of Fresh Air

Efficient

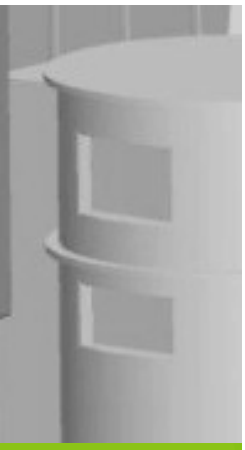
Economical

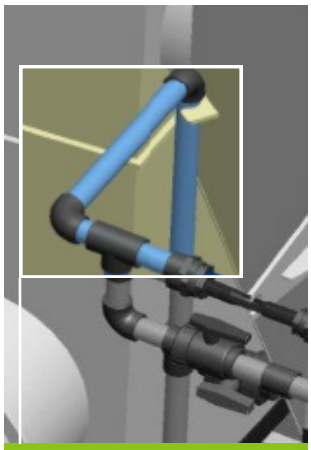
Compact

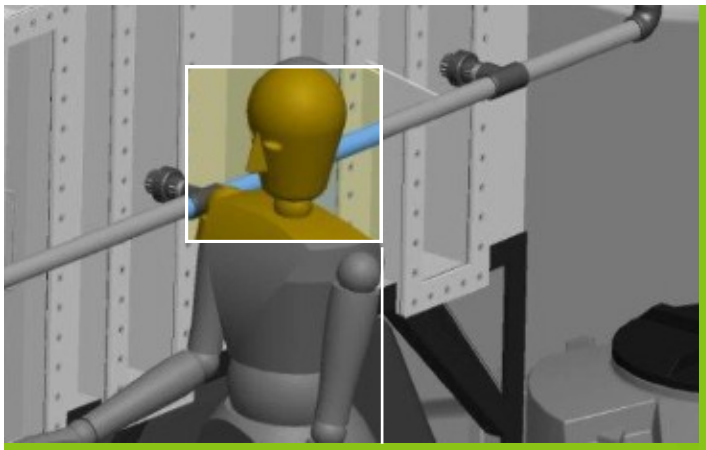
VTfiltration

Fluidized Bed Bio Filtration

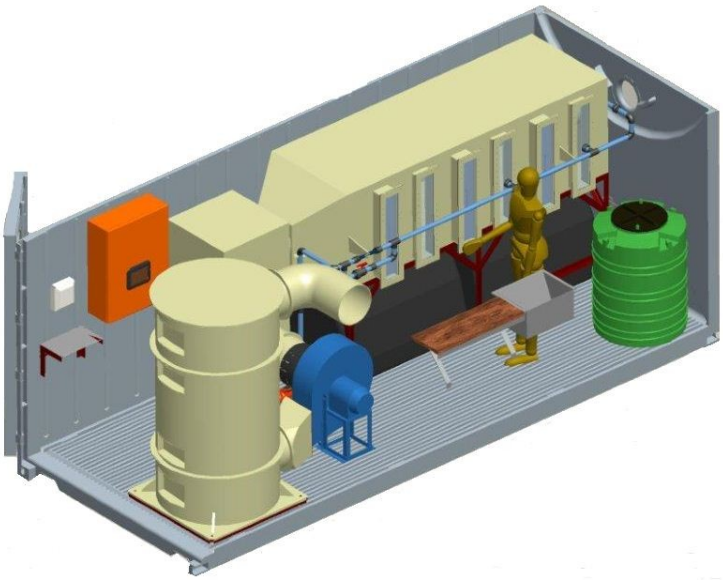
Ultimate **Odour** and **VOC** Control







www.VTfiltration.com



- 1/10 the size of Static Bio Filter
- Very Low Maintenance Cost
- Controlled Humidity - No Effluent
- Removes 99.60% of H2S
- Complies to Most Stringent Standards
- Self Regenerating Media
- Modular and Mobile
- Small Footprint With High Capacity

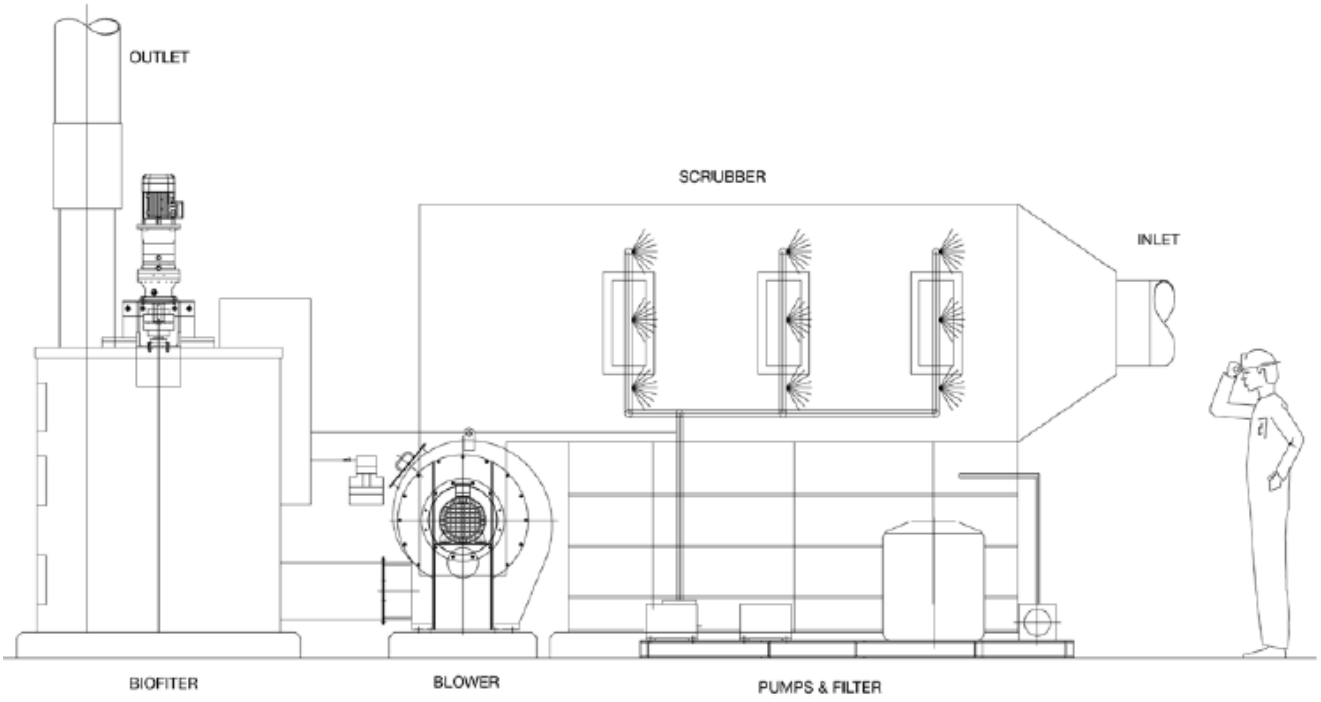
We say with confidence that this is the best Bio Filtration technology available on the Global Market today!

W Series

VTfiltration

A Breath of Fresh Air

Waste and Waste Water treatment - inconsistent air stream.



VT Filtration Systems' W-Series was developed for treating odours in typical wastewater applications where the main pollutant is hydrogen sulphide. Other pollutants, occurring in lower concentrations, which are also removed by the system include:

- Other Total Reduced Sulphur (TRS) compounds including mercaptans, dimethyl sulphide, dimethyl disulphide
- A variety of Volatile Organic Compounds (VOC's)
- Ammonia

The W- Series uses a two phase approach for the removal of pollutants:

Phase 1 – Ozone Scrubbing

- Soluble hydrogen sulphide (H2S) is absorbed into the scrubber brine.
- Ozone is used as the oxidant. It is generated from oxygen with no hazardous by products.
- Ozone is introduced into the solution where it oxidises the pollutants (H2S, SO2) to sulphates.

Phase 2 – Fluidised-bed Bio filter

- TRS compounds are removed (mercaptans >90%, sulphides >85% and any remaining hydrogen sulphide >99% or 0.1ppmv.
- VOC's are removed >90%
- Pollutants are oxidised by bacteria to form a harmless bio-sludge. The bio-sludge waste falls to the bottom of the filter and is drained away from the plant on a continuous basis.
- The media humidity is controlled to optimise phase transition of pollutants.

The W-series is the smallest and most cost effective system available for its application. This is mainly due to three factors:

1. We combine two processes into one system, thereby targeting specific pollutants more effectively.
2. Ozone scrubbing is a very efficient way of removing hydrogen sulphide from an air stream.
3. Our patented fluidised-bed bio filter has at least 20 times more active surface area per unit volume than the most efficient static bed bio filters.

W Series

Other advantages over using only bio filtration include:

Reduced start-up delays and downtime

- The scrubber is a purely chemical process, so there is no start-up period for removal of the main pollutant, hydrogen sulphide (>99%).

Replacement of the Bio filter media is not necessary.

- The media consists of inert PVC pellets, which provide a growing surface for the bacteria. It does not compact or decompose.
- There is no deterioration of the active biomass over time, because waste bio-sludge is removed from the media on a continuous basis.

Handles peaks and variations better

- The scrubber buffer solution absorbs the peaks and variations in the inlet hydrogen sulphide concentrations (up to 500ppmv).

Other sources of hydrogen sulphide where the W-series is effective include: petroleum refineries; unrefined petroleum product depots; natural gas plants; petrochemical plants; oil sands plants; pulp and paper plants that use the Kraft pulping process and stock feedlots.

Our 700m3/hr Evaluation Unit is available for trial installations. This is a fully functional 2 phase unit.

System Requirements:

Power Supply: 380V AC

Water Supply: 3/4" connection to potable or clear effluent supply (minimum 3 bar).

PH Stabilizer such as Lime/Caustic consumption: Varies between 0.3 to 1.5 litre/100,000m3 of air treated and is dependant on the hydrogen sulphide concentration.

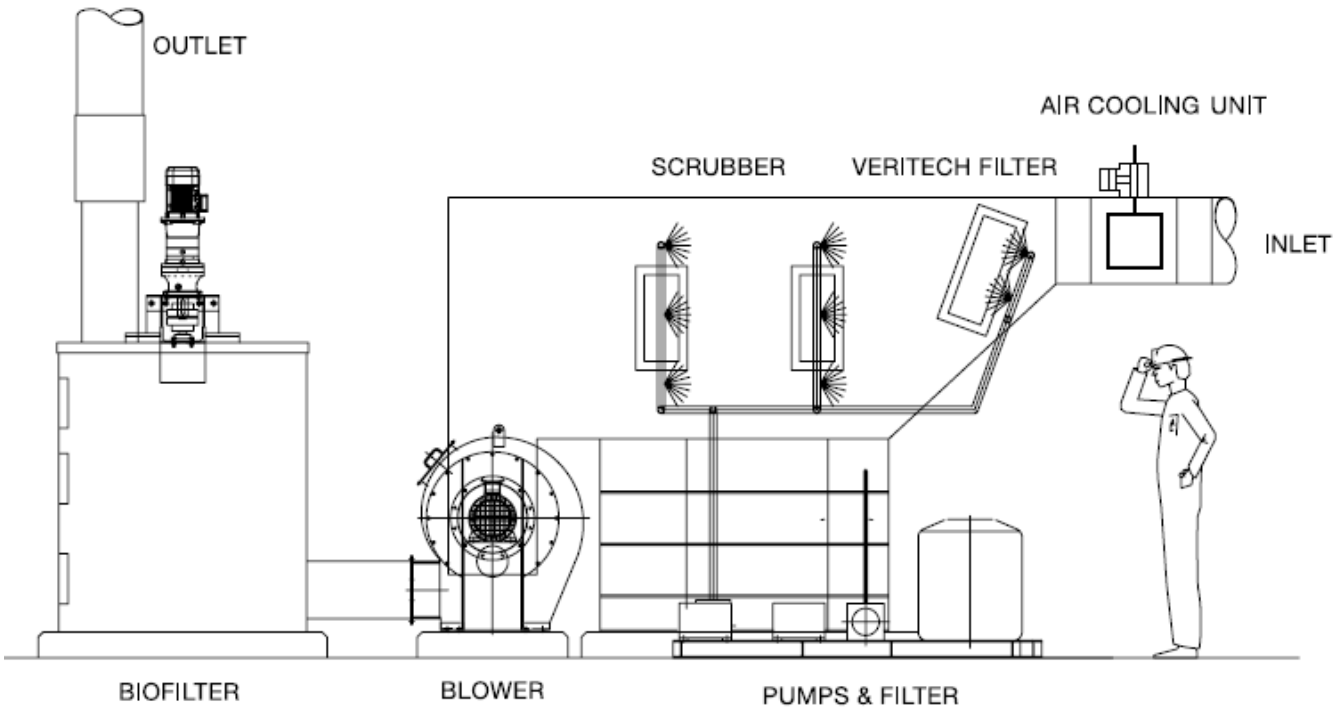
Wastewater drain: 110mm sewer connection or similar

Spatial:

Model	Capacity	Footprint	Height
VT3000W	3,000 m3/hr	6 x 2.5 m	2.5 m
VT6000W	6,000 m3/hr	6 x 2.5 m	2.5 m
VT15000W	15,000 m3/hr	12 x 2.5m	2.5 m

R Series

Constant & Identified Air Stream - such as Rendering Plants



VT Filtration System's R-series was developed for treating odours from food waste rendering plant applications, typically comprising:

- Total Reduced Sulphur compounds (sulphides and mercaptans)
- VOC's including aldehydes, ethylamine, organic acids and PAH's
- High ammonia concentrations

Typically, these emissions must first be cleaned of fats and particulates before the cocktail of odorous compounds can be removed by a combination of wet scrubbing and bio filtration.

The R- series uses a three phase approach for the removal of these pollutants:

Phase 1 – Veritech Filter

• Fats and particulates are removed through mechanical filtration.

Phase 2 – Wet Scrubbing

• Soluble pollutants (mostly ammonia) are absorbed into the scrubber brine and oxidised to harmless by products.

Phase 3 - Biofiltration

- VOC's and TRS's are oxidised by bacteria to form a harmless bio-sludge. The bio-sludge waste falls to the bottom of the filter and is drained away from the plant on a continuous basis.
- The media's humidity is controlled to optimise phase transition of pollutants.

The R-series is the smallest and most cost effective system available for its application. This is mainly because we combine three processes into one system, thereby targeting specific pollutants more effectively:

1. Wet scrubbing is a very efficient

2. Our patented fluidised-bed bio filter has many times more active surface area per unit volume than the most efficient static bed bio filters.

3. Our patented Veritech filter is proven to be the most efficient fat filter available, thereby ensuring that the downstream processes are not clogged by fat.

A Breath of Fresh Air

R Series

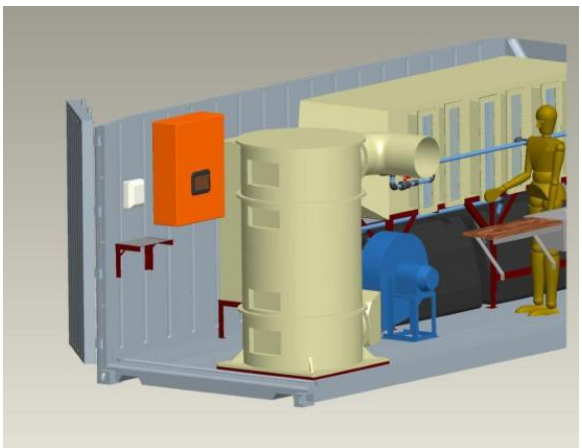
Other advantages include:

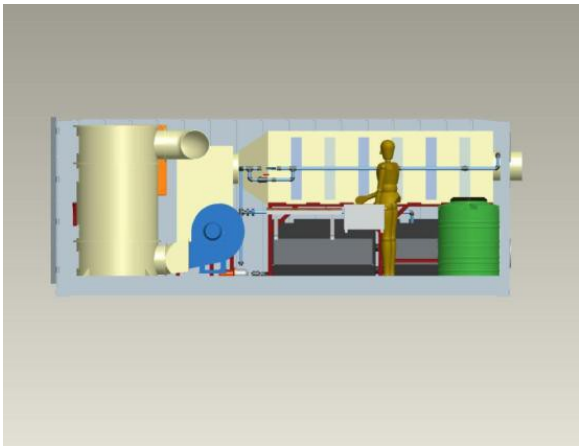
Replacement of the Bio filter media is not necessary.

- The media consists of inert PVC pellets, which provide a growing surface for the bacteria. It does not compact or decompose.
- There is no deterioration of the active biomass over time, because waste bio-sludge is removed from the media on a continuous basis.

Operational feedback and maintenance contracts are available.

- All operational parameters can be monitored via our website.
- We offer an operation and maintenance service on all of our systems.





Spatial:

Model	Capacity	Footprint	Height
VT3000R	3,000 m3/hr	6 x 2.5 m	2.5 m
VT6000R	6,000 m3/hr	6 x 2.5 m	2.5 m
VT15000R	15,000 m3/hr	12 x 2.5m	2.5 m

System Requirements:

Power Supply: 380V AC

Water Supply: 3/4" connection to potable or clear effluent supply (minimum 3 bar).

Sulphuric acid (H2SO4) consumption: Varies between 0.3 to 1.5 litre/100,000m3 of air treated and is dependant on the ammonia concentration.

Wastewater drain: 110mm sewer connection or similar

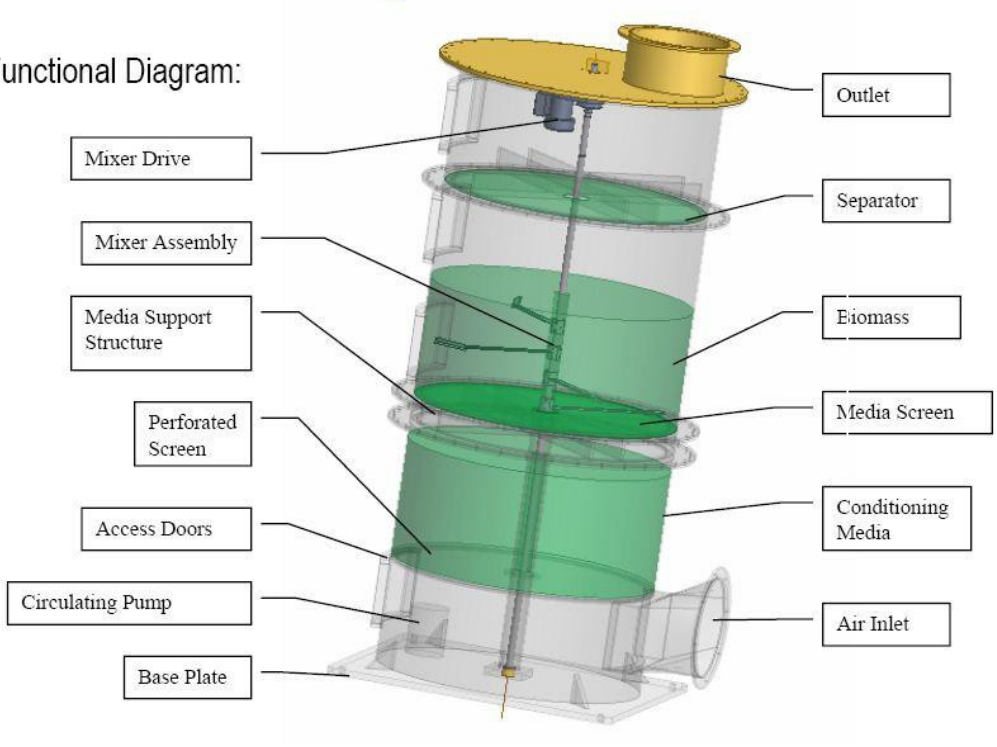
A Breath of Fresh Air

A Breath of Fresh Air

VTfiltration

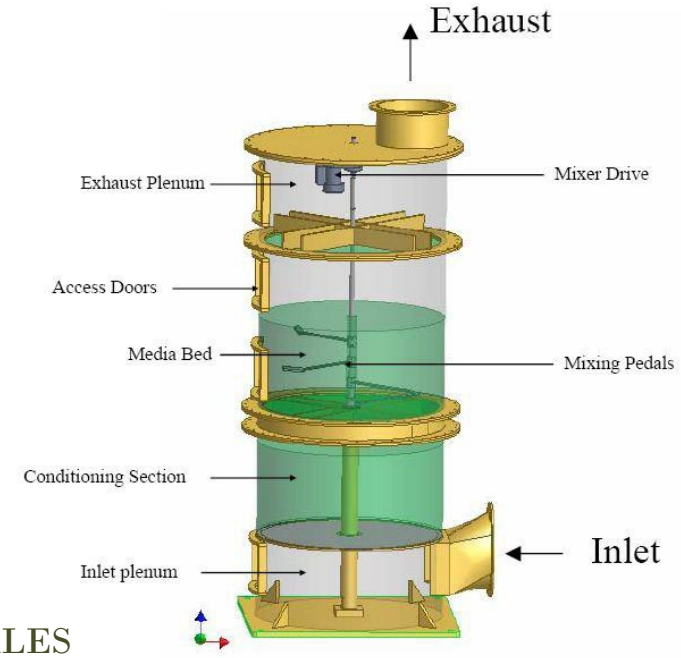
Process Diagram

- Functional Diagram:



How it Works

The contaminated air passes through the pre treatment section before entering the patented continuously agitated fluidised biomass where the rapid bio oxidation takes place. The cleaned gas stream then passes through a post filtration air polishing phase if required.



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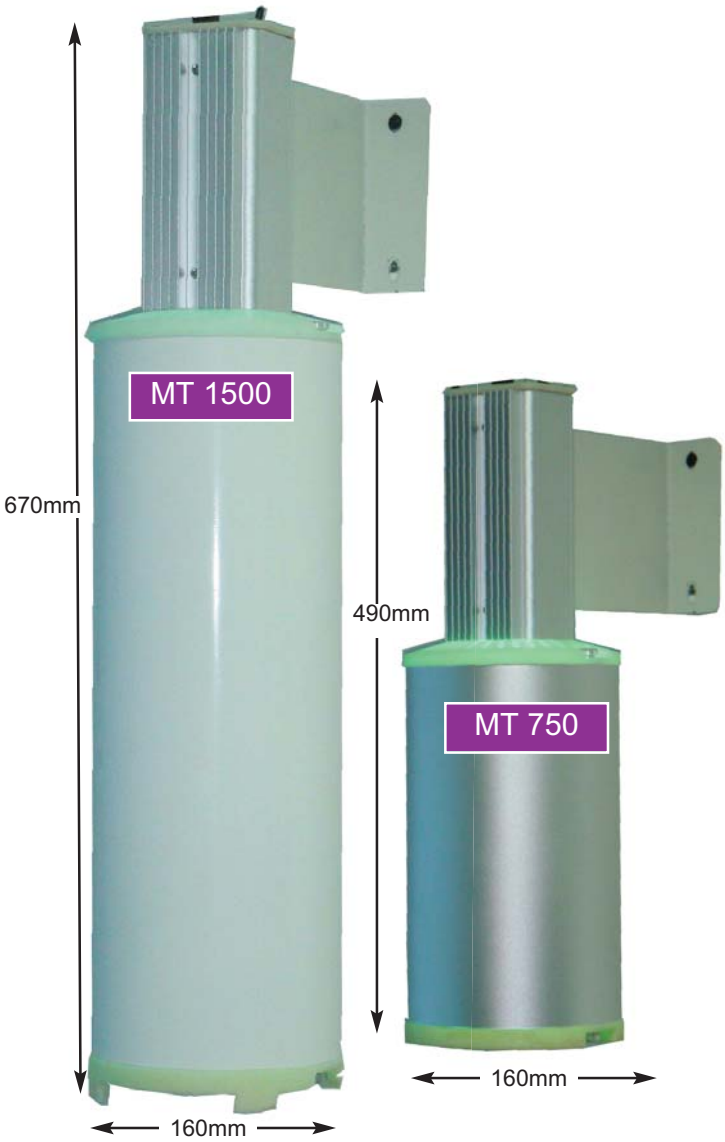
Maxi Environmental Limited

Maxi Thermal MT 750, 1500

If you could control odours while reducing costs why would you not do it?



Odours and infections are created by Bacteria, Viruses, Mould, Fungi and Volatile Organic Compounds (VOCs) found in the air and on surfaces.

Environmental Protection legislation makes it an offence to manage waste in a manner likely to cause harm to human health or the environment, including offence to the senses. Waste processing, sewerage, poultry plants, food manufacture, composting and many more industrial processes are all subject to odour control regulations

Cleaning, filtration and chemical dosing cannot control the source of the odours while masking odours with strong fragrances can only have a limiting effect. In just eight hours one bacteria can multiply to 8 million suggesting that continuous processes are required.

The Maxi Thermal 750 and 1500 offer 24/7 control of odour and infections in large enclosed spaces. The unique process uses the latest in thermal convection and U/V technology to kill up to 98% of pathogens in the air and on surfaces. Each unit offers coverage from 40m^2 to 70m^2 and a choice of lamp strengths to manage varying levels of contamination.

Hidden effects of Industrial Processing Bacteria and Viruses:

Unpleasant Odours

- Perceived poor hygiene and poor management
- Higher cleaning costs and premature refurbishment
- Non-compliance with legislation

Health Risks

- Kidney Infections, Common Cold, Influenza, Food Poisoning, Hepatitis
- Poor personal hygiene moves risk elsewhere
- Increased absenteeism and staff turnover

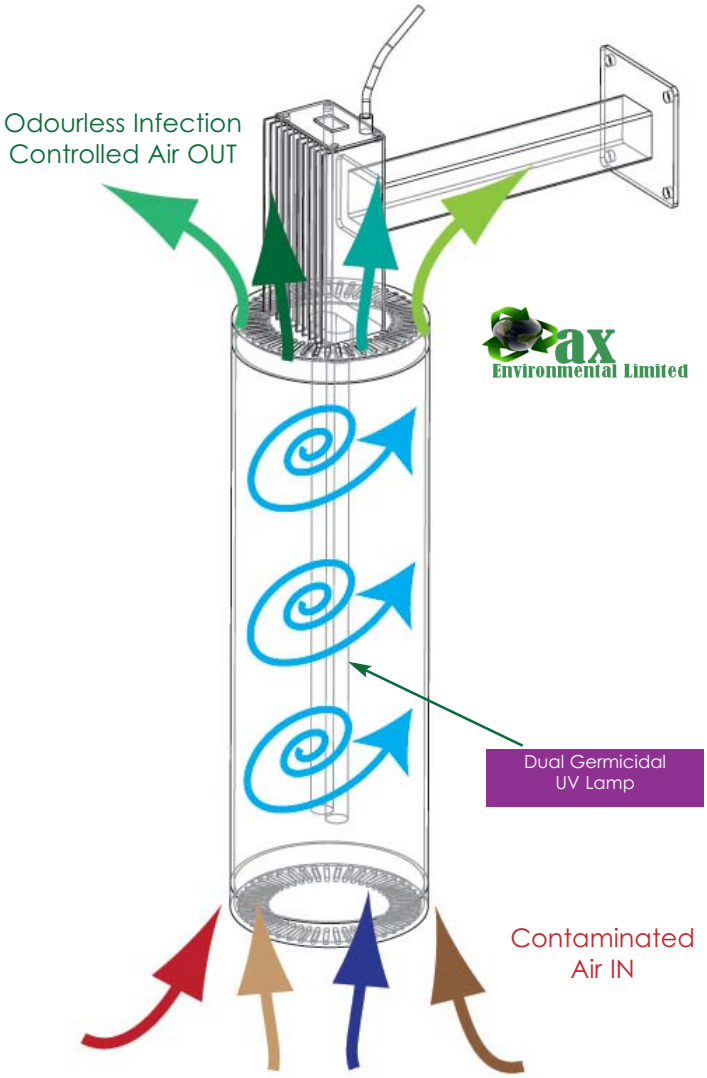
Health Protection Agency

HPA Porton Down labs proved that in one hour of continuous operation a standard Air Steril MP20 unit killed 98.11% of airborne contamination. The HPA concluded that these results demonstrated the effectiveness of the Air Steril technology.

The Complete Air Purification Solution

Maxi Environmental Limited

Control Odours Eliminate Harmful Bacteria



How Does Air Steril Thermal Convection Work

The line drawing above shows the inner workings of an Air Steril Maxi Thermal unit

By unassisted thermal convection, the unit takes in contaminated air and purifies it using our unique dual lamp system. The dual ultraviolet light operates at the peak UVC wavelengths. One lamp makes ozone (O^3)and the other lamp coverts the ozone to hydroxyl radicals (OH) short-lived but powerful destroyers of the DNA of airborne pathogens

Specialist thermal convection smoothly moves air through the unit, and distribution of air over the dual lamp is controlled to increase exposure to the UV light providing maximum pathogen destruction both internally and around the internal space environment.

With a MT decontamination air purification unit from Air Steril you will

- Control odours 24/7
- Improve working environments
- Help staff healthcare
- Reduce chemical usage
- Reduce deodorants and perfumes
- Improve the image of your organisation
- Comply with legislation

Improving air quality in industrial processing plants will clear odours and improve the healthcare of your staff and visitors. The Air Steril Maxi Thermal 750 and 1500 eliminate unpleasant odours and controls harmful Bacteria and Viruses both in the air and on all exposed surfaces 24 hours a day, 365 days a year. Suitable for all enclosed spaces but not for use in areas of sedentary continuous occupation. With minimal maintenance and low consumption, they provide a green solution which improves the air quality and local environment for all users.

The advanced technology of the Maxi Thermal unit allows the control of Bacteria, Viruses and Moulds both in the air and on surfaces more efficiently than ever before. All of this is achieved without fans and with very low energy consumption The custom designed Thermal convection system ensures that contaminated air processed through the unit achieves optimum *dwell time* in the purifying chamber. As the processed air leaves the unit then in itself it becomes an efficient cleaning agent targeting pathogens both in the air and on surfaces.

The Maxi Thermal offers a unique design without the need of a fan motor or moving parts. All parts which could be affected by onerous off-gassing of caustic materials are encased an a hermetically sealed insulated chamber.

For more information call

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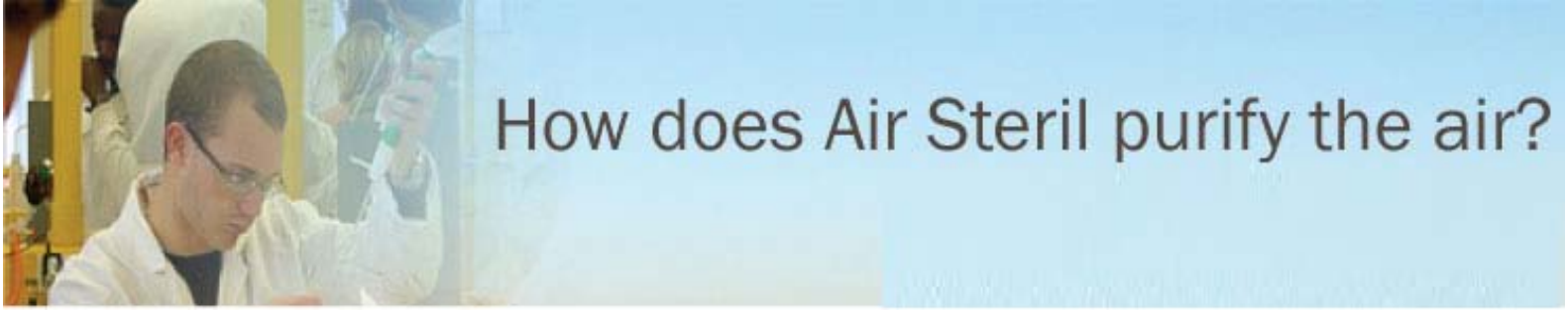
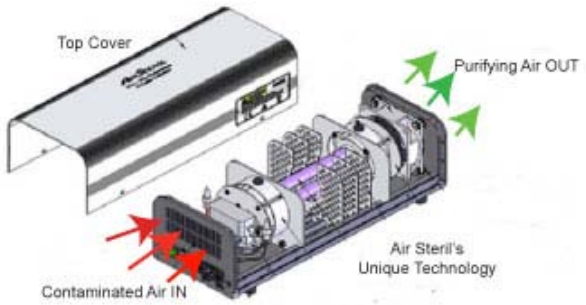


There are five independent mechanisms that Air Steril units use. Each mechanism can be individually controlled to create tailor-made solutions that meet specific purification applications and requirements.

The five technologies are:

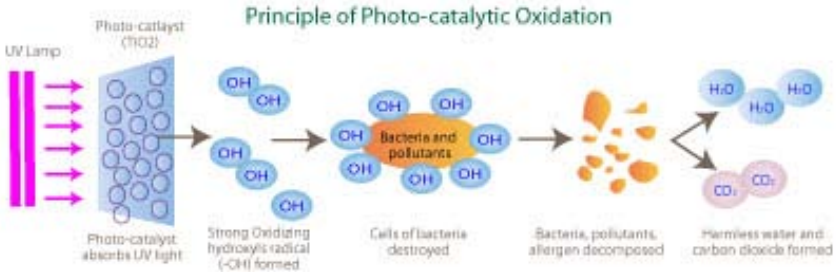


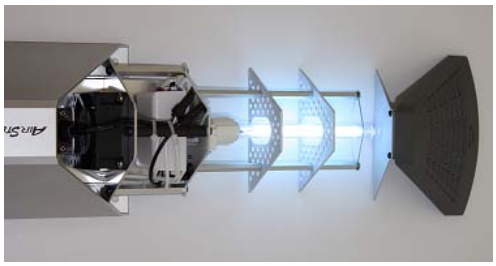
Internal
- Germicidal Irradiation (UV light)
- Heterogeneous Catalysis

External
- Triatomic Oxygen Sterilization (Ozone)
- Plasma Quatro
- Super Oxide Ion Generation

Germicidal Irradiation (UV light) will kill micro-organisms as the air passes through the unit by disrupting the DNA of micro-organisms and preventing reproduction.

The Titanium Dioxide Plates inside the unit act as a Hetrogeneous Catalysis with the UV light to transform oxygen into a reactive state so it accepts a single electron, the molecule that gave up the electron is oxidised. The result is the production of Superoxide Ions. Part of this process also produces Hydroxyl Radicals which are one of the strongest oxidizers known, stronger than ozone.





The negatively charged Superoxide Ions work by electrically charging air contaminates as small as 0.01 microns and causing them to form clusters, thus assisting removal from the air and aiding the other processes.

Triatomic Oxygen (Ozone) is excited oxygen atoms produced via a catalyst in the lamp (Quartz). Triatomic Oxygen, will eliminate bacteria, viruses, fungi and VOC s in the air and on exposed surfaces as it leaves the unit with the air flow.

Plasma Quatro is the gas energized by the high intensity UV light, it leaves the unit with the airflow and consists of a mixture of activated oxygen, triatomic oxygen and superoxide ions. These interact with each other giving a very efficient purification of the air and all exposed surfaces. Many times more efficient than ozone or UV light working alone.

AIRsteril
infection & odour free environment