Steam Engineering is a division of Vortomech Industries Inc. has successfully established an international reputation for the quality, safety, and efficiency of its high-grade industrial steam solutions. Our success in the concrete markets is a reflection of Vortomech’s progressive attitude towards technology and design. Whether it’s a large overseas fabrication or smaller domestic trade, we offer a consistent, global service model that is supported by the same engineers and craftsmen who build our products.

Challenge the standard. We are committed to the highest levels of excellence, and will work with our customers to adapt any of our current heating solutions to their needs.

- Kiln curing of concrete pipes, blocks and other concrete products.
- Steaming of aggregate piles in winter to prevent freezing.
- Sparging of liquids and slurries in pulp and mining operations.
- Sterilizing growing rooms and potting soil, heating bales for mushroom industry.
- Reconstituting airplane de-icing fluid.
- Internal cleaning of transportation tank to remove materials and speed drying.
- Heating of hot water for processing and personal use.
- Pelletizing in feed mills.
- Heating and inflating plastic liners for underground sewage lines.
- Heating wheat to increase production by 2%.

**STEAM GENERATOR SIZING**
10 to 300 Boiler HP (50,000 to 12,000,000 BTU/HR)

Upto 450°C Maximum Steam Pressure
Natural Gas, Propane or #2 Oil Fired Burners

**PRE-CAST & AGGREGATE HEATING**
Aggregate heating in colder climates is essential for ready-mix, pre-cast, and block plant operations. Steam Engineering exceeds the customer’s needs efficiently with their aggregate heating systems.

**WHEAT AND GRAIN HEATING**
The newly designed Wheat Heater System is an innovative, rugged and effective product able to increase production yields by 2%. Compatible with existing low pressure boilers or new Steam Generator systems under 15PSIG.

**MUSHROOM GROWING INDUSTRY**
Maintaining health code requirements and preventing mold / mildew in growing rooms, Steam Engineering designs low pressure sterilization systems specific to the customer’s needs!
The direct fired steam generator incorporates a mixer-burner with a tough, refractory lined combustion chamber which ensures safety, efficiency and many other improvements over current steam generating systems. This new system drives air into the mixer-burner, combining it with fuel where the mixture is ignited as it enters the combustion chamber. Combustion is 100% completed. Water is then sprayed into the hot gases exiting the chamber, thereby creating INSTANT STEAM. It also capitalizes on non-condensable stack gases which represent a useful supply of energy when combined with the steam rather than being vented, thus maximizing efficiency.

**New and Improved** - **PROPANE, NATURAL GAS AND OIL FIRED.**

<table>
<thead>
<tr>
<th>MODEL</th>
<th>ST102L</th>
<th>ST302L</th>
<th>ST502L</th>
<th>ST1002L</th>
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<tbody>
<tr>
<td>Output in BTU's per hour</td>
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<td>3.0/1.0 MM</td>
<td>5.0/1.75 MM</td>
<td>10/3.3 MM</td>
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<td>44 GPH</td>
<td>88 GPH</td>
<td>132 GPH</td>
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<td>18.3 GPH</td>
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Most modern boilers will list an efficiency of about 80% “from and at 212°F”. This means that if water enters the boiler at 212°F it will require 1,212.5 BTU’s to produce a pound of steam (970 BTU’s). Since process and concrete curing systems use 100% make-up water (50°F) this water must be pre-heated or heated by the 80% efficient boiler. 162 BTU’s must be transferred to the make-up water to raise its temperature from 50°F to 212°F.

- A boiler will consume 202.5 BTU’s to heat this water.
- A boiler, thus, requires 1212.5 BTU’s plus 202.5 BTU’s for a total of 1415 BTU’s to produce a pound of steam (970 BTU’s) – assuming everything is ideal.
- This represents a maximum theoretical efficiency of 68.5%.

To this must be added the losses which occur due to intermittent firing, tube scale, improper combustion, startup and shutdown, standby radiation, operating radiation, excessive line radiation, blow down and steam leakage.

**DEFICIENCIES IN BOILER SYSTEMS**

**STEAM CYCLE EFFICIENCY LOSSES**

IT IS RARE TO FIND A BOILER CURING CONCRETE OR IN A PROCESS SYSTEM WITH NO CONDENSATE RETURN, OPERATING AT MORE THAN 50% EFFICIENCY.

Also, since boiler tubes are subject to corrosion, often expensive chemical treatment of water is necessary to reduce this corrosion or oxidation. This will vary from minimal water softening, (which we recommend for our systems) to chemical treatment, which can cost $5,000.00 annually or more.

**STEAM GENERATOR FIELD SERVICE AVAILABILITY**

Steam Engineering is an industry leader in its field. In addition to designing, manufacturing and servicing its own line of Instant Steam Generators, its technical service personnel possess knowledge, experience and trouble shooting skills that have been developed over years of providing service for its equipment as well as those manufactured by others.

Steam Engineering can provide the experience and inspection techniques necessary to assess the condition of your equipment and identify potential problems.

These problems usually occur in the following areas:
- Flame and Combustion Equipment such as flame safeguards, spark plugs, ignition transformers and regulators;
- Safety Components such as water, gas, temperature, pressure and limit switches;
- Valves such as water and fuel valves, actuators and solenoids;
- Electrical Components such as wiring, relays, timers, motors, drives, controls for temperature, heat, water, fuel, moisture and pressure;
- Blower Components such as inlet filters, drive alignment and belt tensioning.

Steam Engineering can provide basic and recurrent training for owners and operators of steam generator systems. Each training program is customized to meet our customer’s specific needs and consists of “hands-on” sessions at the site. We can also provide comprehensive commissioning and start-up service after the repairs or refurbishing are complete. Most parts orders placed with Steam Engineering are shipped within 24 hours to help reduce your downtime.

When you find yourself in need of In-Depth Technical Help or Assistance, turn to STEAM ENGINEERING 1-800-973-1999.
Each steam generator is complete with its own CSA approved control panel, programmed to control the steam generator in accordance with the specific process requirements for which it was sold.

The panel is easy to operate, simple to understand, no proprietary software is required and a fully detailed ladder wiring diagram is provided for trouble shooting. The control wires are numbered for easy reference and trouble shooting.

If an alarm situation does occur, the relevant pilot light is latched “on” so that the operator knows that a situation occurred, even if the situation corrects itself and the unit restarts before the operator is available.

All the components are field replaceable at site. Parts are readily available from Steam Engineering (800) 973-1999.

The following are provided on the front face of the panel:
- switches for operator interface;
- pilot lights for trouble shooting;
- a programmable steam temperature controller;
- manual, fused, 3-phase disconnect switch.

The steam temperature controller includes:
- a hi-temperature limit with automatic reset;
- a digital read-out of the steam temperature;
- steam temperature can be manually adjusted and controlled through PID;
- shuts off fuel if temperature gets too high, allows unit to restart when temperature lowers to normal range.

A manual start, automatic stop count-down timer is also supplied for basic operation.

The panel includes three dry contacts for connections from an automatic control panel (in the field) so that the steam generator will have automated operation to cycle and hold a specific temperature in the process area. The process area can be one or several requiring temperature control. The automatic control panel can also be supplied once the customer's specific requirements are known. Wiring between the steam generator panel and any field devices or the automatic control panel is by others.
This control panel and valve assembly equipment is designed to allow automatic temperature control of the water tank and aggregate/sand pad or bins. The CSA approved panel is available in addition to the operating panel mounted on the Steam Generator.

The control panel is complete with a 7-day timer to control the on/off cycle of the Steam Generator. The timer can be programmed for Ordinary Timer Operation (factory setting), Multiple-day Operation, Cyclic Operation, or Pulse-output Operation. The Steam Generator panel must be set to “Auto” before operating this separate panel.

The valve assembly consists of a tee with two butterfly valves (air or electric operated) with interconnecting linkage so that steam passes either to the water tank or to the aggregate/sand pad or bins. Each butterfly valve has two limit switches, one to indicate valve open and the second to indicate valve closed.

The panel includes a selector switch with three settings; Sand, Sand & Water, and Water. The Sand setting allows steam to heat the aggregate/sand pad or bins only. The Sand and Water setting allows steam to heat both the sand and the water, however, the water temperature takes precedence over the sand temperature. Once the water temperature has reached its set point, the butterfly valves change to allow the steam to go only to the sand bin. If the water temperature drops below its lower set point, the butterfly valves change position again so that the steam is directed only to the water tank. The Sand and Water setting will maintain the temperature of the water tank first and then heat the aggregate/sand pad or bins.

To heat only the water tank, the setting switch is turned to the Water position. The butterfly valve will open to the water tank and close to the aggregate/sand pad or bin. If the Process Value Temperature reading in the water tank is lower than the Set Value Temperature, the Steam Generator will start and heat the water to the Set Value Temperature. When the water temperature reaches Set Value Temperature, the Steam Generator will go into its cool-down mode.

In the cool-down mode, the Steam Generator will switch to air, and the butterfly valves will turn to the direction of the aggregate/sand so that the water temperature does not cool down too quickly, however, the residual warm air from the burner will continue to flow. After 25 to 30 minutes, if the temperature is still above the Set Value, the Steam Generator will shut down and restart only when the water temperature drops below the Process Value Temperature. If the temperature drops below the Process Value while the Steam Generator is in the cool-down mode, the steam cycle will restart and open the butterfly valve towards the water tank and close the valve to the aggregate/sand pad or bin.
CONCRETE CURING
AUTOMATIC CONTROL PACKAGE
MULTIPLE KILN OPERATION

This control panel and valve assembly equipment is designed to allow automatic temperature control of multiple curing kilns. The CSA approved panel is available in addition to the operating panel mounted on the Steam Generator.

The separate control panel complete with

- timer
- selector switch
- butterfly type shut-off valve (air or electric operated)
- dry contacts to receive electrical input from field temperature sensors in each of the kilns

The Steam Generator panel must be set to “Auto” before operating this separate panel.

The temperature in each curing kiln is sensed and controls the opening and closing of electric or air operated steam control (shut-off) valves, one per kiln. All field wiring, piping and valves will be supplied and installed by others.

Upon filling a kiln, the operator closes the access door, sets the temperature controller to the required curing temperature and pushes the start button.

Steam is introduced into the kiln until the pre-set curing temperature is reached, as sensed by the thermocouple in the kiln. The steam generator cycles off when the pre-set curing temperature is reached. If the temperature on the kiln drops to a pre-set differential temperature, the steam generator restarts and delivers steam until the pre-set curing temperature is reached. The steam generator then cycles off until it is needed again.

If more than one kiln is being cured at the same time, this heating process is the same for each of those kilns. If the temperature in those kilns is above its pre-set differential temperature the steam control valves would be closed to their respective curing kiln except for the last one being started-up. As each kiln area comes up to its operating set point temperature, the thermocouple sensor closes the control valve to that specific kiln area.

When all of the kilns are up to their curing temperature, all of the valves will be closed and the generator will cycle off. If the curing temperature in any of the operating kilns falls below the pre-set differential temperature, the steam cycle will restart and the applicable steam control valve will open to the kiln requiring the steam.
Oil Fired Steam Generator

COMpletely Self-Contained

Output – 350,000 BTU/Hr
Drive – 12 hp Diesel Engine
Fuel – Diesel or Number 2 Oil

Water and fuel tanks with required pumps are included

Dimensions –
48" wide x 66" long x 64" high
Empty weight – 1200 lbs approx.
A new and exciting product that Steam Engineering has recently developed is our Wheat Heating System. When comparing the cost savings of operating our new fuel efficient Steam Generator versus using a standard boiler, as well as the ability to increase your production by 2%, the choice is clear. The newly designed Wheat Heater System is an innovative, rugged and effective product.

Our Wheat Heaters are constructed with a 4-pass SCH40 1-inch piping. Standard bolted flange connections make the Wheat Heaters modular, thereby allowing them to be easily added or removed in an evolving plant. The large surface areas are optimized to create a more evenly heated area and an overall better product. This is perfect for controlling moisture content in the milling process. Sizing is never an issue as we have a full series of different sizes, which are stackable to fit within your allowable area as well as meeting your bushel per hour requirements.
Hanson Pipe and Products Canada, Inc., located just east of the Greater Toronto Area of Ontario, is one of the most northerly of Hanson’s concrete pipe plants. With temperatures cutting well below freezing during the winter months, finding a method to heat our aggregates was critical to meet the Ontario Concrete Pipe Association standards for concrete. We must maintain a mean temperature of 60 to 80 degrees during the production process.

We investigated several methods of heating aggregates in early summer 2000. We found that the most efficient and environmentally friendly method is a state-of-the-art instant steam generator manufactured by Steam Engineering. This generator is based on new technology and has proven itself by providing heat to raw materials at other companies that produce paving stones, barrier walls and ready-mix concrete.

The highly efficient steam generator uses up to 50% less fuel than conventional boiler systems. The burner achieves this efficiency by consuming virtually all the fuel/air mixture with minimal undesirable products of combustion. Also, the unit only uses fuel when steam is required; therefore, it does not have to maintain a mass of water at high temperatures.

An immediate benefit of the system is that steam is available on demand. Within 15 seconds of switching on the machine, steam is available. The unit pressure does not exceed 15 psi, thus eliminating the need for a special boiler room, stationary engineer and high insurance rates.

H.R. Stark, a local mechanical engineering firm, installed the system in October. The steam lines extend from the unit to the outside aggregate bins and an aggregate storage pad used for storing extra sand and stone.

Just in time for freezing temperatures, steam emanates from our aggregate bins and storage piles. It will take a month of monitoring temperatures before we can develop actual preset steaming times.

The steam generator system enables Hanson Canada to maintain critical concrete temperatures to produce a consistent, quality product during the cold winter months.
Steam Engineering has your Winter Weather Solution!

WINTER ONSET CAUSES PROBLEMS FOR EVERYONE—ESPECIALLY IN THE READY-MIX INDUSTRY

The exact date may vary some in different parts of the country, but November often marks the hot concrete surcharge season for many Ready-Mix owners and operators. Along with the extra revenue however, comes the same old headache of how to ensure that your product meets your customers’ specifications. Many solve this problem by firing up an old, inefficient hot water boiler, hoping they can heat enough hot water to somehow blend their way through the winter without losing customers or loads. Others direct wet boiler-made steam into bins, causing a whole new set of problems like rusting and saturated sand. Still others buy heated sand for as much as $3.00 a ton!

Your solution continues with our Steam Engineering Ready-Mix Automation Package. This reliable combination of electronics and mechanics was designed to ensure that you have your needed supply of hot sand and hot water to get going each and every day. Picture this: a sand pad piped with steam lines, sized to hold your full day’s demand, and a hot water tank with steam piping, capable of handling the first hour or so of operation.

Past methods for a mediocre solution have included many operators attempting to superheat water up to 180°F to compensate for frozen aggregates and to blend with cold water for truck side tanks. Such “solutions” have proven to be very inefficient, as the energy to superheat this volume of water is extremely expensive and most water systems are not designed to handle the needed capacity. We’ve come a long way from these outdated strategies!

Steam Engineering will program an automation system that will pre-heat your sand pad in the middle of the night. As a rule of thumb, one million BTU can heat 40 tons of sand to 125°F in one hour. When left outside, this sand would only lose 10°F to 15°F per day. With your sand heated to 125°F, you no longer need to superheat water. Still, however, Steam Engineering technology allows you to heat water to 140°F very efficiently, at a rate of 1,200 gallons per hour for every one million BTU. Our automation system includes a thermocouple that, when placed in a water tank, will ensure your ideal temperature is met before you open your doors for the day. Then, as water is drawn off and replaced, the system will start and stop the unit automatically as needed to maintain the desired temperature throughout the day.

If your location is not suited for heated pads, then bin heating is a simple alternative. Proper steam piping in your bins, along with our hot dry steam, will deliver heated sand with consistent moisture—without damage to your bins. The Steam Engineering automation package comes with two valves, with cross linkage and motorized actuator to switch back and forth from the sand pad to the water tank automatically, as programmed.

For more information on our Direct-Fired Steam Generators and our Ready-Mix Automation Systems please call – Steam Engineering at 1-800-388-1339.
Steam Engineering
Your heat source provider of choice

Coldstream Concrete
drycast, wetcast, concrete pipe, and ready-mix – four businesses within the same industry with very different applications. While most companies in this field just focus on one method of operation, Coldstream Concrete encompasses all four.

Based in Ilderton, Ontario, Bob Brown's family business has evolved to meet the needs of his expanding market of small towns and rural areas. Coldstream really is a one-stop shop for any concrete application need, thanks to its commitment to house four business divisions all under one roof.

Four years ago, Mr. Brown looked closely at his growing company, hoping to determine a strategy to consolidate some of his business and manage his overall vision. He realized that all four of his business divisions shared one common necessity: STEAM. The company needed to heat sand, defrost gravel, cure wetcast, drycast, concrete pipe and heat water. At the time, Coldstream used different heat sources for each application. Mr. Brown first heard of Steam Engineering from a used-equipment dealer, although he was already familiar with the concept of direct-fired steam generators. He was certainly aware of the huge fuel savings that would be available to his operations with a direct-fired unit, and he was confident that his out-dated boilers were only running at 60% efficiency at best.

After reviewing all the major players in the direct-fired market, Bob Brown decided that Steam Engineering could meet his needs better than any of its competitors. Tom Byrnes Sr., President of Steam Engineering, and his team started to work with Coldstream to engineer an installation solution that would fit the bill for the demanding applications.

Brown's business concerns centred on its five concrete pipe kilns, three wetcast/drycast tarped curing areas, and a 4,500-gallon water tank, as well as three 120-ton sand and gravel pads, three sand and three gravel bins, and a conveyor belt. To utilize every last BTU, Bob piped the exhaust from his water tank into his ready mix aggregate building for extra heat. Coldstream comprises 19 different heating applications in total – a demanding sum for any source.

Coldstream represents the most challenging of Steam Engineering's installations to date, including over 1,500 feet of six-inch steam-header. The job took over one year to complete, during which time Brown contracted a local electrical company to design an automation system to manage the day-to-day operations of the direct-fired system.

These days, Bob Brown couldn't be happier with his heat source decision. Steam Engineering has really come through as a company he can trust for his current needs, as well as his future demands. Coldstream Concrete now understands why direct-fired steam generators have proven themselves over and over again to be the most efficient, cost-effective, energy-saving heat source for concrete applications. Steam Engineering continues to be a leader in this field of technology.
Steam Generation Made More Efficient and Flexible

Continental Mushroom in Metcalfe projects annual savings of around $110,000 from new, more flexible steam generation system. Project qualifies for energy efficiency system incentive.

At A Glance:

- Acting on Steam Audit recommendations, Continental Mushroom purchases an instant steam generator for mushroom bed sterilization.
- Estimated annual reduction in consumption of natural gas is approximately 300,000 m³
- Plant qualifies for financial incentive of $15,000 from Enbridge Consumers Gas.

Continental Mushroom, established in 1973 in Metcalfe, Ontario, produces 9 million lbs of button mushrooms (*agarius bisporus*) per year for shipments throughout the Ottawa Valley, Quebec and the Eastern seaboard. Mushroom growing is an exacting science and steam sterilization plays an important role in maintaining good growing conditions. Heat alone cannot ensure complete sterilization of wooden growing beds. Steam is needed to penetrate cracks and crevices. With 33 mushroom houses, each producing six crops, the facility uses nearly 170,000 lbs of steam a year.

Finding an Energy Efficient and Environmentally Friendly Solution

The Enbridge Consumers Gas steam system audit was conducted in 1998. This audit found that steam production costs were high and that most of the steam was being used for sterilization. It recommended looking for a more efficient system of steam generation. Michael Fakhouri, an Enbridge Consumer Gas energy management consultant, recommended an instant steam generation unit developed by Steam Engineering Inc. in Aurora, Ontario. Enbridge Consumers Gas connected Continental Mushroom with the supplier and arranged a visit to a site already using the technology. Steam Engineering installed the unit on a test basis in December 1999.

After some fine-tuning and adaptation to the particular site requirements, this equipment is now being used for mushroom house and bed sterilization and a second unit is planned. The sterilization process requires steam at 65°C for up to 24 hours for the first round and again for up to 16 hours on a second round. Reliability is essential. The old steam system comprised of two boilers (150 hp and 250 hp) operating at 110 psi and was located in the middle of a 1000 ft long production facility. Steam was delivered to the mushroom houses through a system of pipes. Two factors contributed to a high cost of steam production:
1) boiler efficiencies were only in the 75% range, and
2) there were some heat losses in the piping system.

Multiple Efficiencies

The instant steam generator uses a highly efficient process of steam production. Air is driven into a mixer-burner, combined with fuel and ignited. Water is sprayed into the hot gases exiting the chamber. This creates instant steam. Stack gases are captured and combined with steam rather than being vented, recovering energy that would otherwise be wasted. The result is 98% efficiency.

The unit does not require pre-heating of make-up water. It is portable and is wheeled from one mushroom house to another as needed – eliminating piping heat losses. Because the generator operates on regular water, there is no cost for chemical treatment. This produces an environmental bonus: the facility uses wastewater from the growing process, solving a disposal problem. Since the instant steam generator operates at 4 psi, it does not require constant monitoring.

The installation required new water and gas lines to the individual mushroom houses. Steam Engineering also made modifications to the original unit to improve its reliability and weather resistance. Lyle Whitham, Continental Mushroom’s General Manager, is so pleased with the performance of the instant steam generator that he is planning to add another. Once conventional high pressure boilers are completely eliminated, he expects to see further savings in boiler insurance premiums.

Multiple Savings

The projected natural gas savings from changing to instant steam generators are 300,000 m³ valued at $86,000. Chemical savings are $24,000. Total cost savings may be as high as $110,000. Continental will require 2 units at a total installed cost of $190,000. The simple payback for the project is 1.73 years. The system brings two environmental benefits: it uses wastewater, which was a disposal problem, and it reduces CO2 emissions by over 578,000 kg per year. This project qualified for a cash incentive of $15,000 from Enbridge Consumers Gas.

Benefits of Instant Steam Generator:

- 24% reduction in steam cost
- Fast payback
- Potential insurance savings
- No stationary engineer required
- Reduced environmental impacts
- No chemical treatment of water

Applications*

- Concrete and stone works
- Food production
- Rubber products
- Water and space heating
- Growing operations
- Animal feed
- Lumber

For further information on programs and services, you can contact Michael Fakhouri, Enbridge Consumers Gas at:

Phone: (613) 747-4055  •  Pager: (613) 780-3304
Fax:  (613) 741-2378  •  Website: www.cgc.enbridge.com
E-mail: michael.fakhouri@cgc.enbridge.com

“It gives us a flexibility that we didn’t have before. We hope eventually it will take over most of our steam requirements.”

Lyle Whitham – General Manager, Continental Mushroom