EMPIRE
BAKERY EQUIPMENT

A COMPARISON
of
DECK OVEN DESIGNS

Rev. 2/26/08

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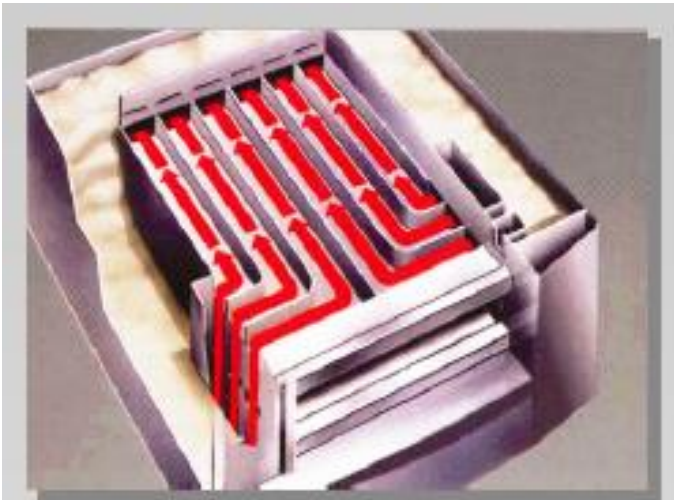
As you look for an oven to meet your production requirements and reduce your fuel usage in making hearth products, there are often many questions as to what is the "right" type of oven to purchase. Today, most bakers are finding that a stone hearth deck oven can DRASTICALLY reduce fuel consumption (up to 75%) and provide unsurpassed bake quality. Some have no moving parts, and because they require no external steam boiler, costly maintenance is greatly reduced as well. When used with a semi automatic or automatic loading/unloading system, these ovens also require less skilled labor and make it much easier to handle many type of breads.

Here are five types of gas/oil fired, stone hearth deck ovens to consider. While they may appear the same from the outside, each has its own baking characteristics and advantages. **The major differences are how the heat is distributed to the decks and the type of materials that are used in the construction**. Another important difference will be how they generate their steam for the baking process.

1. CICLOTHERMIC



This type of oven circulates hot gasses between and around the decks either through a heat exchanger or directly from the burner. The air is circulated by means of a powerful fan, usually located at the rear of the oven. Other than the baking surface, these ovens are typically all steel construction with mineral wool type insulation. The advantage of the ciclothermic is the ability to change temperatures rapidly. Also some have the ability to regulate the temperature on the top 1 or 2 decks to a different temperature than the bottom decks to accommodate various products at the same time. These ovens are not usually recommended for baking 'heavy' products. As with a hot air heating system in a home, when the burner shuts off, there is a tendency for the oven to cool down rapidly until the thermostat calls for more heat. Then when the burner re-ignites or goes back to high flame, the temperature will rise again quickly. This produces more oven temperature fluctuation than might be desired for baking larger breads with longer bake times, especially if you are using steam and desire a good thick crust.

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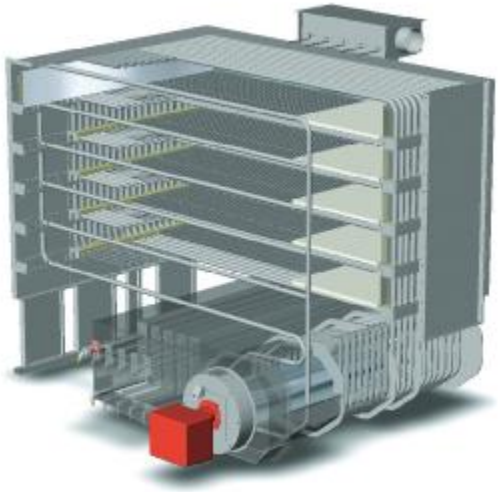
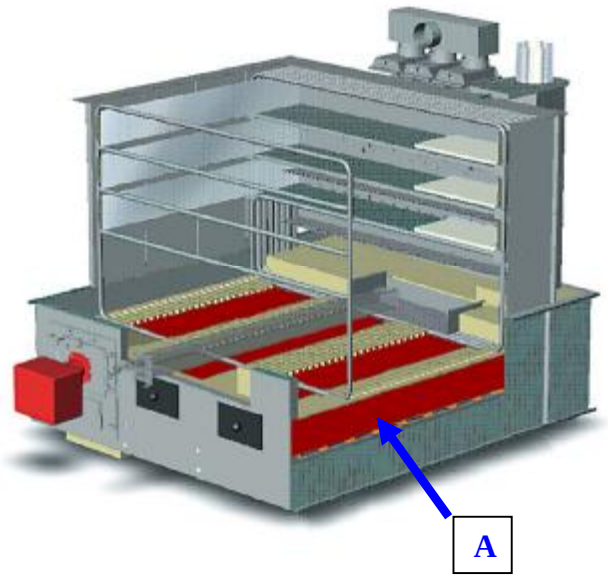
VAPOR TUBE

A Vapor Tube oven circulates its heat through the use of a series of tubes, approximately 1 inch in diameter. A small quantity of purified water is placed in the tube which is then welded and sealed tight. Each tube, stacked vertically, surrounds the oven and has cross-pipes running between the decks. The water inside the tubes is heated by the burner section until the water inside boils and turns to steam. At that point the steam circulates through the pipes, radiating its heat as it goes, eventually turning back into water and returning to the bottom where the entire process begins again. Because these ovens utilize no moving parts or fans to distribute the heat, they are noted for their evenness of baking from deck to deck and from side to side. They also provide excellent baking quality since the tubes remain hot and are not subject to the start and stop of the airflow like the Ciclothermic. The three most common versions of this oven are:



A: All Steel "Ring Tube" models: These ovens utilize vapor tubes that wrap around an all steel heat exchanger. They are the easiest to install and move, and allow change of temperature more quickly than other designs. For many years, most of the vapor tube ovens installed in the U.S. were of all steel construction and performed well in many situations. As demand for hearth breads has increased, however, many bakeries find that an all-steel oven has less ability to maintain the heat necessary for high production baking and steaming. This can result in a greater change in baking properties or unevenness of baking after 6 hours or so of heavy production.

B: Steel and Cement Construction:
European bakeries have long used a combination of steel, cement and brick to achieve the baking properties of a brick oven. These ovens utilize brick and cement in the fire chamber **(A)** which act as a "heat sink". In this way, when the oven is loaded with bread, and steam is introduced into the chamber, absorbing the chamber's available heat, the brick and cement supply a continuous, smooth flow of heat without the burner having to try and play "catch up". These ovens offer the best balance between heat retention and efficiency and flexibility of temperature.



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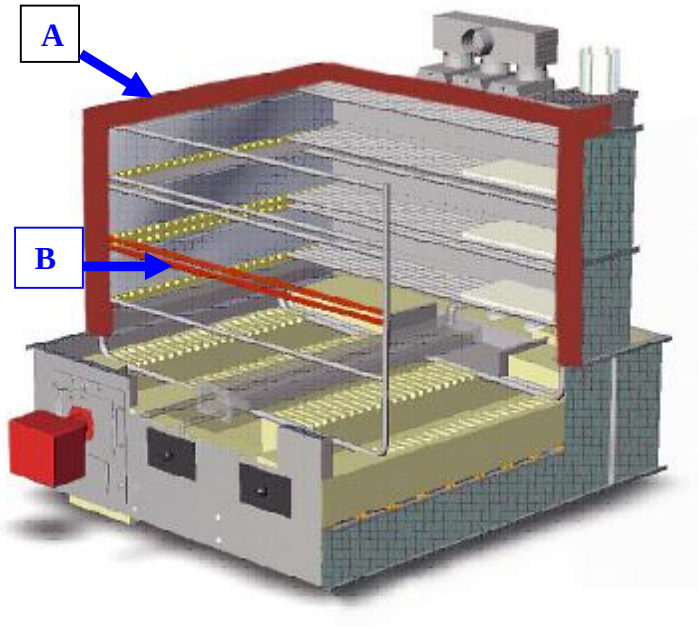
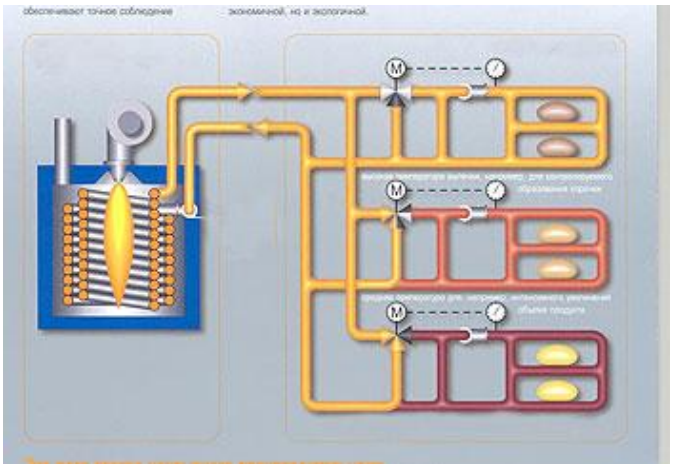
C: Cement Lined Vapor Tube Ovens: For the ultimate in "brick oven baking" and maximum fuel efficiency, many bakers prefer models with cement-lined walls and roof panels. **(A)** Filling the walls and roof panels with cement (and thereby surrounding the entire baking chamber with thermal mass) retains the greatest amount of heat. **This greatly increases fuel efficiency** and is preferable for baking large or heavy breads and for heavy production schedules. (This is the same principal that makes a brick oven bake so well). In addition, the greater heat retention allows this style oven to have two pipes running between each deck **(B);** one for the top of the deck below and one for the bottom of the deck above



The additional cement in these models provides the ability to store a greater amount of heat and therefore do not depend on the burner to immediately supply the heat needed. This gives a vastly superior baking characteristic, similar to the traditional brick oven. In addition, there is always sufficient heat retained to properly reheat the steam generators between bake cycles. Most bakers, who have used both styles of vapor tube oven, and wish to closely simulate an actual brick oven, prefer the cement and brick design.

D: Thermoil Ovens: Utilizing a system of radiators within each deck, these ovens are supplied with oil heated by an external (usually remote) heater. The oil is pumped to the ovens radiators through a series of welded pipes and then returned to the heat system for reheating. Through regulation of the oil volume, these ovens flexibility in temperatures of various decks. While offering excellent bake quality and flexibility, they are by far the most costly and involve the greatest amount of machinery to distribute the heat. Therefore it is up to the individual to decide if the additional cost and maintenance are worth it.



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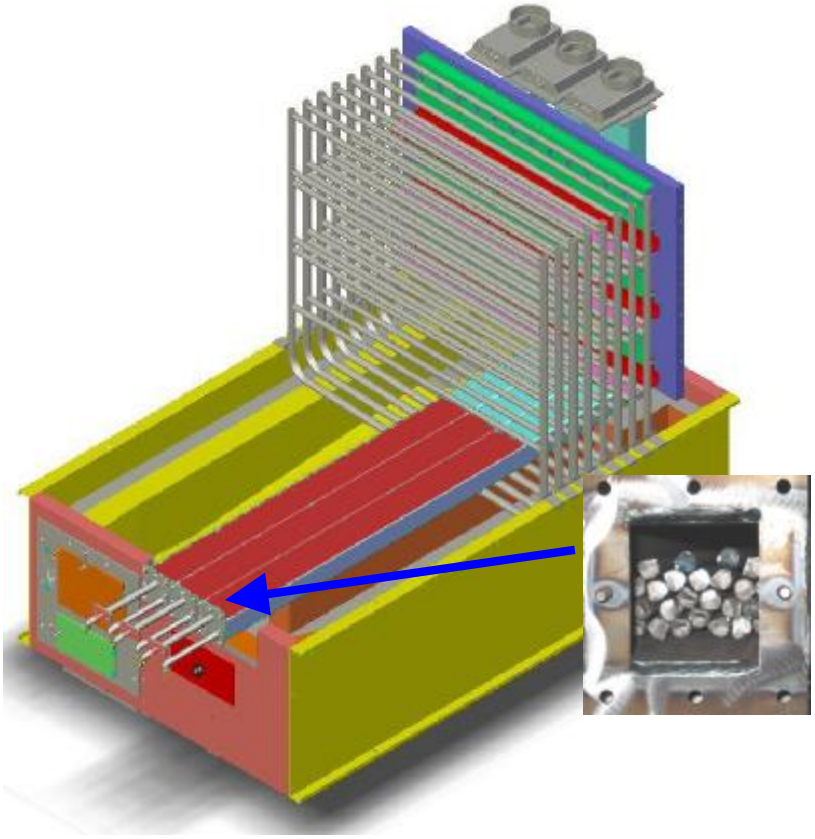
Baking Steam (steam in the baking chamber for color and crust) is usually generated from the same heat source as the baking heat, the burner. The major difference in deck ovens will be where the steam generating units are located and their ability to produce consistent steam in rapid cycles to accommodate the constant loading of the oven in high production situations. The best application is to have heavy duty steel boxes filled with a heat retaining material, such as construction grade steel bars (rebar) directly in the hottest part of the heat production system. In a vapor tube oven this will be under the bottom deck. As an alternative, some manufacturers place troughs on the side of each deck, but it is generally thought that in mid to large size ovens this is not as effective and does not have the ability to "recover" quickly enough bake after bake. Some ovens offer dual generators for each deck in order to compensate for a lack of heat retention. In any system, it is important that the steam system be accessible for cleaning and occasional decalcifying, if necessary.



When deciding on a deck oven, it is important to keep your goals and requirements in mind. Will you need to vary temperature frequently? Will you be baking load after load and require higher heat retention or is flexibility in temperature more critical to your operation? Taking these and other factors into consideration before you buy will save you money and assure your long term satisfaction.

No matter what type of deck oven you choose for your hearth products, it will provide you with superior bake quality and tremendous fuel savings over other types of ovens, and your best bet will be to consult with a knowledgeable and qualified supplier who can help you evaluate your needs and recommend the appropriate oven.

For more information on any of these types of ovens, contact

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