

Commercial Cooking with Superheated Steam

Looks good, tastes great, stays moist

AT A GLANCE

- **Cooking industry needs speed, simplicity, attractive appearance**
- **Superheated steam oven currently in development**
- **New approach provides more throughput in same space**

This may be the answer to a longstanding request from the commercial food cooking industry: a cooking system that is fast, precise, and minimizes moisture loss in cooking a wide range of meat products. The answer may be steam, but not the soggy wet steam of the steam table. We're talk-

ing sizzling hot, superheated steam that can cook meat products in a very short period of time. The company that's working on this is Pyramid Food Processing Equipment Manufacturing, Inc. The technology is intriguing.

Pyramid is no newcomer to commercial ovens. It currently has a line of gas-fired infrared wall ovens that are well-regarded. They are principally being used for finishing cold-smoked meats like hams and turkey breast. In the infrared oven an overhead infrared tube projects onto a moving food conveyor. Saturated steam can be injected into the system to eliminate flaming and smoke. Dwell times of 30 seconds to five minutes are enough to thoroughly cook meat products and other foods. Pyramid has achieved a reputation for a reliable and accurate oven that puts an attractive browned finish on meats. Probably because of their experience using steam in the infrared oven, the company began looking at the use of steam alone as a cooking source.

MARKET IS COMMERCIAL FOOD INDUSTRY

According to Pyramid representative Mark Holm, the application is probably not kitchens, or school cafeterias. "We are talking about the companies that cook pork chops, bacon, chicken, seafood in volumes of tens of thousands of pieces daily," he says. "With today's trend away

from at-home 'scratch' cooking, there is an ever growing market for precooked entrees. The companies that produce these foods demand equipment that gives them speed, consistency and excellent moisture retention. A system that would brown and fully cook in one step would be a godsend. We think we may have the system."

MOISTURE MANAGEMENT A CRITICAL NEED

Food moisture management is one of the key issues. Meat products are sold by weight, so unnecessary moisture loss is to be avoided. More importantly, the flavor of many meat products and their suitability for freezing depend on retaining the natural moisture and the volatile flavors within the food. Commercial meat cooking operations look for systems that retain the moisture and cook the food quickly, but put an attractive brown on the outside. This is the advantage Pyramid sees in its new system.

The answer, they believe, is a combination of superheated steam for browning and surface cooking, and saturated steam for finish cooling. Superheated steam isn't the misty plume from the teakettle. It is a very hot, very penetrating force — a steam hot enough to brown meats quickly. Produced by raising the temperature of saturated steam in a gas-fired superheater, this steam plays across the surface of the food on the traveling grill conveyor in the oven enclosure. It begins the cooking process and puts an

ON THE COVER

At Duquesne University, an industrial-sized Solar Taurus turbine is used for campus electric power generation, as well as supplying steam for campus heating and to serve large absorption coolers for campus chilled water service. Photo courtesy Solar Turbines.

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Pyramid Food Processing Equipment Manufacturing, Inc.
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Pyramid Superheated Steam Test Oven

Chicken Wings: One step browned and cooked by superheated steam

attractive golden finish on the meat. A saturated steam cooking section finished the job, retaining product moisture.

PROTOTYPE OVEN NOW COMPLETED

Pyramid has completed the preliminary research and has built prototype ovens. They find their original confidence in the concept is not misplaced: It does an admirable job of high-speed cooking of chicken, pork chops, and virtually every meat product they've tried. The cooling cycle can be precisely set by adjusting the conveyor speed through the oven.

Because of the very rapid cooking characteristic of the superheated steam oven, the physical size of the machine is smaller than many alternative methods. This is important because it means that a food processing company can achieve more throughput in the same floor space. This is valuable to processors who are looking to increase production in a fixed space.

Another attraction to this new oven design is that it can use existing plant steam, needing only the superheat function to bring it up to the desired temperature. Holm points out, "Using steam is an efficient process, using less energy per pound of finished product than a multi-step microwave plus browning process, less even than straight gas-fired infrared cooking." It's strange to think of steam

actually browning food, but the new oven design does that, and in an especially even and attractive way.

POTENTIAL FOR INCREASING PRODUCTION

In experimental runs in a demonstration oven, thick pork chops were completely cooked and browned in four minutes, and chicken wings in two and a half. This is 20% faster than conventional commercial ovens, and translates to 60,000 pounds per week of potential additional production. Equally important, the cooked product yield is increased by 2% by minimized product moisture losses. This is seen as equivalent to 312,000 lbs per year, or a savings of \$724,000. A modular design

allows units to be assembled in process sizes appropriate for the food to be processed.

Pyramid has a 50,000 square foot manufacturing facility in Tewksbury, MA, and has the sales and service capability across the U.S. At the current time, the firm continues to develop the superheated steam oven, hoping to create partnerships with major food processors in the near future. They are looking at both a standalone product and a possible conversion of existing commercial conveyor ovens to use superheated steam.

The superheated steam oven has large potential in the commercial foods business.

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