

Natural Gas Proves Superior for Infrared Food Processing

AT A GLANCE Natural-Gas IR Burners

- Can brown surfaces of meat, fish and poultry to retain juices
- Can rapidly remove moisture from fried and baked goods
- Have excellent reliability
- Minimize energy costs

Fig. 1: A major application for IR ovens in food processing is browning of meats, fish and poultry prior to cooking. IR adds heat preferentially to the material's surface, rapidly drying and searing it, and locking in the juices in the bulk material. Pyramid Food Processing Equipment Manufacturing, Tewksbury, Mass.

One of the major trends in food processing is the demand for convenience foods by the consumer. The average family now has two working parents, who do not have the time to spend hours in the kitchen preparing meals. Consumers now are looking for meals that are easy to prepare but which have excellent taste and flavor.

As food processors strive to develop new food products to meet this changing demand they are looking at new preparation techniques that are often proprietary, and natural gas fired infrared (IR) burners are being used in new and different ways.

Pre-Drying and Browning

IR is ideal for a variety of food processing operations. IR's short wavelength means that it does not penetrate deeply into the food. It is an excellent means of pre-drying sheeted products, such as taco chips, tortillas, and pocket breads. Through IR, food can also undergo an initial cooking step such as browning or toasting. One example is pre-cooking or browning the surface of meat products to seal meat juices before finish-cooking the product's interior.

Unlike foods cooked deeply in convection or microwave ovens, IR toasting sets up a strong temperature gradient between the surface and interior. Just what this does depends on the food type and its thickness.

Thin doughs, such as tortilla chips, dry out completely and quickly, setting them up for further processing, such as deep-fat frying or further toasting by continued IR exposure. Thicker doughs, such as pocket breads,

become layered. They end up with a tightly sealed "skin" on the outside with lighter, fluffier material inside due to the high temperature gradient through the material.

IR's surface-heating property also helps to dry out moisture-laden doughs for sheeted products, such as tacos and tortillas. The material is

basically a ground corn, and moisture levels sometimes approach 50% to 60% of the product weight. "We're looking to get that down to 15% to 20% in a very short time," reports Tony Wolfer, Senior Project Engineer at APV Baker in Grand Rapids, Mich., which manufactures a line of equipment covering the whole range of food-processing equipment, from dough blenders through cooking equipment.

Typically cookie dough is in the 30% range and the manufacturer needs to get it down into the 15% to 20% range, then to finish the conversion. Dry dog food typically starts out at 35% to 40%, and needs to reach 12-13% moisture before it goes in the bag. "We can get rid of a lot of that moisture very quickly with the infrared without 'skinning' the product," says Wolfer.

Over the past 20 years beef has steadily lost market share to chicken, because the chicken industry has given consumers a premium product, which is easy to prepare. The major beef product is the roast that takes hours to cook. Now beef producers are fighting back, by trying to give consumers pre-cooked beef products that can be heated at home in a microwave oven. The key challenge is to seal the surface and keep the flavor and texture similar to oven cooked meat. This is where IR comes in.

"We're subjecting food products to a high infrared heat to brown them first, which seals in the juices," says Mark Holm, Director of Sales at IR oven manufacturer Pyramid Food Processing Equipment Manufacturing in Tewksbury, Mass. "This is all a continuous operation. There's a belt moving through the machine to brown the product and it's usually finished off in a high humidity environment (i.e., steam) to complete the cooking process."

Pyramid is also working with fish products. Fig. 1 shows a salmon steak browned by 90 sec. exposure to IR radiation. The surface is thoroughly cooked, making it non-porous so that the interior liquid cannot escape. Subsequent finish cooking by exposure to steam will cook the interior to the desired degree without drying out the product.

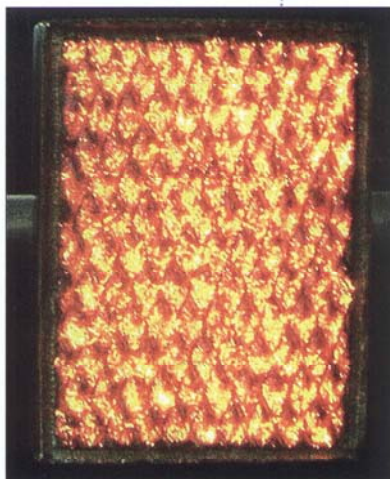
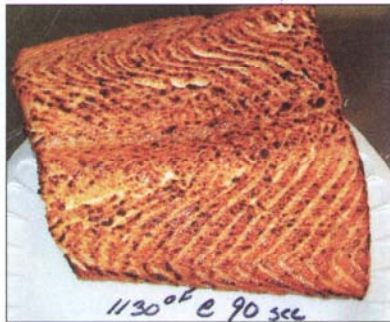


Fig. 4: Red Ray's all-metal IR gas burner uses a sintered stainless steel mat to generate IR radiation. The gas/air mixture flows between the steel fibers to burn when it reaches the flame front outside the mat. Red-Ray Manufacturing Company, Cliffside Park, N.J.