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Testing and Simulation Lab Helps Food Manufacturers Establish Parameters for Blanching, Cooking, Pasteurizing and Cooling Processes

The most comprehensive lab of its kind in the food processing industry, Lyco manufacturing's 5,000-square-foot testing and simulation lab is designed for analyzing blanching, cooking, pasteurizing and cooling processes for its clients' rice, pasta, dry bean, vegetable and pouch products. The lab can test processes with hot water or steam, and cooling with 33° F chilled water, using full-scale production machines or simulators.

By Jim McMahon

The food processing industry has been in the midst of a consumer-driven evolution for the past decade, one that is continuing to unfold.

Consumer demand for more diverse choices in food products has motivated manufacturers to respond with a wider selection of new product offerings in all categories – fresh, frozen and packaged foods. The specialty foods sector has particularly experienced strong growth with the popularity of ready meals, ethnic dishes, and health-conscious foods like whole grains. Many of these products are being introduced by startup food processors, while established food manufacturers are expanding their product lines.

Retailers, in an effort to consolidate shelf space for this influx of new products, have reduced in-store inventory and order sizes, pushing more just-in-time ordering back to food manufacturers. Consequently, food processors are running shorter production runs, requiring more system changeovers, which means more frequent equipment cleaning to eliminate cross-contamination from food residue and allergens.

Recent FDA requirements, such as the Food Safety Modernization Act, and track-and-trace mandates have emphasized more stringent requirements for food safety, including cleanliness and sanitation in food processing.

In order to adapt to these changes in food processing and stay competitive, many manufacturers have had to upgrade their processing technology to more efficient systems. In doing so,

reevaluation of process parameters and validation of process procedures by measurable testing is necessary to achieve consistent and quality food products that also meet FDA safety standards.

Process Validation for Blanching, Cooking, Pasteurizing and Cooling

One sector of the food processing industry that has adapted well to the changes in the market and seen considerable improvements in process efficiency is the technology for blanching, cooking, pasteurizing and cooling, for the processing of rice, pasta, dry beans, vegetables and pouched products. These cooking and cooling systems are integral to the manufacture of thousands of food products.

A key player in the manufacture of these cooking and cooling systems, that has taken a leading role in developing process solutions for food manufacturers, is Lyco Manufacturing (Lyco). Since 1980 Lyco has been a leader in the design and manufacture of these processing systems. But now the company has also taken on a new initiative.

For the past several years now, Lyco's headquarters and manufacturing plant in Columbus, Wisconsin – a small town of 5,000 residents located 30 miles outside of the capital city of Madison – has been a magnet for food processors from throughout North America, Western Europe and Australia, who come to work out precise processing parameters for their food products. Specifically, parameters for blanching, cooking, pasteurizing and cooling processes for their rice, pasta, dry beans, vegetables and pouched products.

Process engineers representing some of the world's most recognized packaged food brands, and scores of other food products found on supermarket shelves, have validated their processing procedures at Lyco's recently-built testing and simulation lab in Columbus.

"In 2005 the percent of companies that were asking us to develop processes for their cooking and cooling lines was probably about 20 percent," said Steve Hughes, CEO of Lyco. "Today, that number is more like 40 percent."

"Food companies are coming up with products that they need to test, and they don't have that ability in their plants," continued Hughes. So they can come into our lab and duplicate as close as they can to what really might happen in their plants."

"We are finding that 30 – 40 percent of our business is coming from new companies, startup companies," said Hughes. "Processing with very rudimentary systems, they want to automate, but they don't know how to get there. With our lab we can really help them develop the process that gives them the best product."

Full-Scale Testing

The test lab is equipped to provide both full-scale and simulator testing – continuous-flow and batch processes – for blanching, cooking, pasteurizing and cooling of rice, pasta, dry beans, vegetables and pouched products.

Where a simulator test might run for 10 minutes, giving a snapshot view of the results from a test process, a full-scale continuous-flow test process may run up to seven hours, typically processing at 20 percent capacity of what it would normally run in their plant. Full-scale testing shows how different process parameters affect both the quality of the water that is being used to cook, and the quality of the product that is coming out.

Test processes can be conducted with hot water or direct steam heat, and cooled with 33° F chilled water.

One of the big draws to the Lyco lab is its capability for full-scale continuous-flow testing with several different state-of-the-art cooking and cooling processes. These systems are:

a) ***Clean-Flow® Blancher*** – For pasta, rice and vegetables – ready-to-eat, fresh and frozen foods. Clean-Flow addresses the need for faster sanitation cleanup time so that prepared meal operations could run many different products in a day. The Clean-Flow in Place System can clean over 98 percent by itself. It uses Hydro-Flow® agitation, which guarantees a uniform process.

b) ***Easy-Flow™ Continuous Cooler –*** Cools most pasta or diced vegetables in 30 seconds or less. This machine is made in a single, 2, 3, and 4 zones. Each zone submerges and mixes product in cold well water (55° F) or chilled (33° F) water where it rapidly discharges heat. The machine will handle any particulate food shapes. The first stage can cool most products from 200° F to below 70° F in under 10 seconds. A second stage cools product to 55° F, and the third stage brings product temperature down to 40° F or below.

c) ***Vapor-Flow® Rotary Drum*** – Steam blancher that is 25 percent the size of steam belts and achieves uniform results. Used to prove-out steam blanching of vegetables. This blancher can switch over from steam to water cooking by simply turning a valve and draining the water from the tank. Water blanching hydrates products, but steam cooking uses 50 percent less energy and 90 percent less water. Steam can also increase recovery by 1 to 3 percent by leaching out fewer solids and nutrients.

d) ***Chill-Flow™ Rotary Drum*** – Hot-fill pouch chilling with chilled water, and/or pasteurizing. For cooling soups, sauces, sausages, hot dogs and other foods more than 40 percent faster than belt coolers. It chills pouches as small as a pack of restaurant ketchup, or up to 5 or 10 pounds. 40° F final temperatures are common requirements. Submerged water cooling is the most efficient and economical method of cooling volumes of pouched food products.

e) ***Pressure-Flow® Continuous Cooker*** – For cooking and hydrating rice and dry beans. It reduces rice and dry bean cook times from 20 and 45 minutes, down to 8 minutes. This

machine was specifically designed to hydrate, par-cook or fully cook dry beans, grains and other particulates, offering processors a continuous first-in/first-out pressure cooker.

Additionally, the test lab provides the following supporting equipment:

f) Continuous Hydrating Simulators – Cross-section machines with one-foot-long cylinders, available in 60-inch or 72-inch diameters.

g) Rotary Drum Wastewater Screens (.020") – With No-Fail running rings.

h) Micro-Drum Liquid/Solid Separation Screens (.008") – Removes 30 percent more solids than .020″ screens.

i) Moisture Analyzers – For measuring moisture content in both high-level and trace amounts in food solids.

"In the lab we can analyze a product's process and provide recommendations on how to improve its quality and consistency," added Hughes. "Our highly-skilled development staff will test different processes and methods to be certain to identify the appropriate recipe, machinery and sizes for the specific application."

"The purpose of the lab is to provide accurate and detailed equipment capacity sizing and process recommendations specific to our customers' food products," explained Hughes. "Evaluating process conditions and making the necessary adjustments maximizes production and yield."

About Lyco Manufacturing, Inc.
Lyco Manufacturing is a world-leading manufacturer of commercial cooking and cooling machines, liquid-solid separation screens, root crop peelers/scrubbers, and snap bean equipment for the processing of pasta, rice, dry beans and vegetables. The company has designed and installed thousands of machines for 50 of the top 100 food companies in North America and many smaller food manufacturers.

Recognized worldwide for its innovative machine designs and the quality of its engineering, Lyco's machinery has set the standard for increased capacity, improved product quality, reduced product damage and faster sanitary changeovers. The company's passion is developing the best customer-aligned, innovative food processing machinery in the world.

Founded in 1980 by owner and Chairman of the Board, David R. Zittel, Lyco Manufacturing is housed in a state-of-the-art 80,000 square-foot facility located in Columbus, Wisconsin, USA, 30 miles northeast of the capital city of Madison.

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