

Biosafety Level-2 Pilot-Scale Processing Facility is Operational

By: Brad Marks, associate professor



Sanghyup Jeong, biosystems engineering visiting assistant professor, posing in new biosafety level-2 lab.

Rapidly changing regulations and market trends are creating a significant need for research to ensure the safety of manufactured food products. The burden-of-proof for ensuring product safety is continuing to increase for food processors, who must, in many cases, prove the safety of a product / process via either inoculated challenge studies or validated microbial models. However, the vast majority of food processors lack the facilities or capacity to meet this need. Additionally, the application of basic research results (at the level of a Petri dish) to a real-world process (at the commercial, manufacturing level) is simply too great of a leap for processors

to make without evidence that the results can be scaled-up.

In order to meet these research and technology transfer needs, Michigan State University has recently completed a unique, Biosafety Level-2, Pilot-Scale Food Processing Facility for inoculated challenge studies, research validation trials, testing with industry partners, and teaching / training. This facility, in Farrall Hall on the MSU campus, enables direct application of the latest research results to real-world challenges in the critical area of food safety engineering.

In a challenge study, the microorganism of concern is inoculated into the food product, which is subjected to an actual processing operation simulating the commercial process. Such studies are impossible in actual processing facilities, where pathogens cannot be brought on site. This new facility (~1,470 sq ft) was designed to accommodate these types of studies for a wide range of applications, and is comprised of a dressing room, a prep lab, a storage room for cleaning and sanitation supplies, a staging area for equipment, and the main processing floor. The main room includes four flexible work stations, with a range of electrical, water, steam, gas, and drain capacities to handle a variety of pilot-scale processing equipment, such as mixers, cooking equipment, conveyors, etc.

This multi-user facility enables MSU researchers to test laboratory-scale research findings in commercial-type equipment and validate computer simulations of food processes and microbial responses. This capacity puts MSU at the forefront of food safety research, both advancing knowledge and directly impacting the safety of manufactured food products. Current industry-partnered projects include: (1) inoculated challenge studies with Salmonella in meat and poultry products processed in a pilot-scale, moist-air

impingement oven, to validate computer simulations of cooking and microbial lethality, (2) testing the efficacy of a low-energy x-ray irradiator for pasteurization of raw almonds (targeting Salmonella) and treatment of raw ground beef (targeting total aerobic bacteria and E. coli O157:H7), and (3) testing an antimicrobial spray system for continuous treatment of conveyor belts in meat and poultry operations. Core faculty members who have existing projects utilizing this facility include Dr's. Bradley Marks (food engineering), Sanghyup Jeong (food engineering), Elliot Ryser (food microbiology), Al Booren (meat science/processing), and Evangelyn Alocilja (biosensors).

Although a few similar facilities exist across the country, the MSU facility has the unique mission of accommodating a wide variety of food processing applications/equipment, rather than focusing on one type of product or process. Additionally, the purpose of the facility is to enable both pre-competitive research and product-specific testing supported by industry partners. Such partnerships will be critical in directly serving the needs of stakeholders. The MSU researchers involved in this endeavor comprise a unique, multidisciplinary team committed to improving the safety of processed food products through innovative research, outreach, and training. Anyone with a potential interest in the facility, including establishing partnerships in this area should contact [Dr. Bradley Marks \(marksbp@msu.edu\)](mailto:marksbp@msu.edu).