

bulk of them in rural areas where they are badly needed. The value of the services those jobs render is nearly \$11 million, but with the multiplier factors in place, the value of the jobs themselves is estimated at nearly \$22 million, for a total impact of almost \$33 million on the state's economy!

It is noteworthy to look at Oklahoma manufacturing statistics: the state has more than 4,200 firms that employ more than 160,000 people. This translates into a \$4.5 billion payroll, 21 percent of the state total. Most of these people work in small firms with fewer than 50 employees.

"The states of Georgia and Maryland have model MEP programs that have proven to be major success. With the proper support, we can achieve similar results," said Karl Reid, Dean of the College of Engineering, Architecture and Technology.

Advances made in tomography

Computerized gamma ray tomography (CT) is a nondestructive examination tool used to study hydrological properties and transport behaviors in both rocks and soils for the past 20 years.

This tomography uses a scanner, similar to a CAT scanner used in most hospitals, to quantify the properties of rocks and soils, said Hsuan-Tsung Hsieh, post-doctoral fellow in the Department of Biosystems and Agricultural Engineering.

Hsieh completed his Ph.D. dissertation on quantification of porous media using an OSU-made gamma ray CT housed in the department's Groundwater Laboratory.

"The beauty of this technology is that you don't have to destroy the rock to see the inside," Hsieh said. "It does provide a tremendous flexibility for future researches and later date verification."

The basic CT concept is to pass high-energy gamma photon beams from the radiation source through the sample and to receive the penetrated signals at the detector, Hsieh said.

"In our laboratory we use a gamma

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turtle business near Lake Tenkiller on Granny's Hillside Farms.

Although the couple has sold thousands of turtles, their operation has been hampered by the need for ready-to-eat turtle food that provides the nourishment required that can be stored for a year on the shelf and be safe and that - most important- the turtle will eat.

Researchers at OSU took on the project and learned box turtles require a lot of protein, which earthworms and minnows provide. They also need a lot of calcium for their shells.

"We learned that color and scent are very important to a box turtle. They like yellows and reds best, and prefer fruity scents," Bowser said. "We used natural fruit scents and even experimented with artificial scents to get them interested. We came up with a "Tender Vittles" version of turtle food that can be formed into a cookie or patty shape."

By using dried, ground-up ingredients, including the earthworms and minnows, in conjunction with vacuum packaging, the patties are holding up well on the shelf. However, Bowser points out that a bit more time is required for the yearlong portion of the trial.

Meat grinder

Joe Vadder, Biosystems senior, is currently working with Bowser on a novel meat grinder.

Although the project was Bowser's idea, the design, ordering of materials and the decision of which shops would build the parts were Vadder's responsibilities.

Eventually, the novel grinder will be marketed to the meat packing industry. The grinder has a unique, safety-minded design, with no sharp blades.

After the machine is complete, Vadder plans to eventually apply for a patent.

Temperature Profiling Project

Last September Vadder began working on a Temperature Profiling Project, which was created for industrial baking.

The profiler will be used in industrial-size baking ovens to monitor the baking consistency of foods produced in mass quantities.

Vadder used dataloggers to monitor the consistency of baking and created a thermal enclosure to protect the profiler from the intense heat of the baking process.

He tested the dataloggers at Advanced Foods in Enid, Okla., where Vadder monitored the oven's baking consistency.

Bowser's and Bellmer's projects are a mere sampling of the kinds of technological advances being made in the food processing industry. Opportunities for biosystems and agricultural engineering graduates seem boundless.

The field of food process engineering has a broad spectrum of opportunities with jobs available in every state. Students graduating with a degree in the food engineering area can pursue careers in process design, product development, quality control or food process research.

The exciting news is the jobs don't go away as long as people keep eating.



Hsuan-Tsung Hsieh, post doctoral fellow, stands beside the CT scanner used to study hydrological properties in rocks and soils.