

## A SPECIAL NOTE

Tours of the Agricultural Engineering Building and demonstrations of research projects can be arranged prior to the dedication by contacting Robert Holmes, professor of agricultural engineering, at (614) 292-6798. A few of the projects that may be of interest are:

- Nursery Container Handling Vehicle. To improve efficiency in the nursery industry, Ohio State agricultural engineers have designed a mechanized transport vehicle for loading and unloading potted or polybagged plants. The tiered vehicle is equipped with movable racks and rollers that allow plants to be loaded at the rate of one per second. The vehicle takes less than 1 minute to load, compared to 15 minutes with current manual procedures.

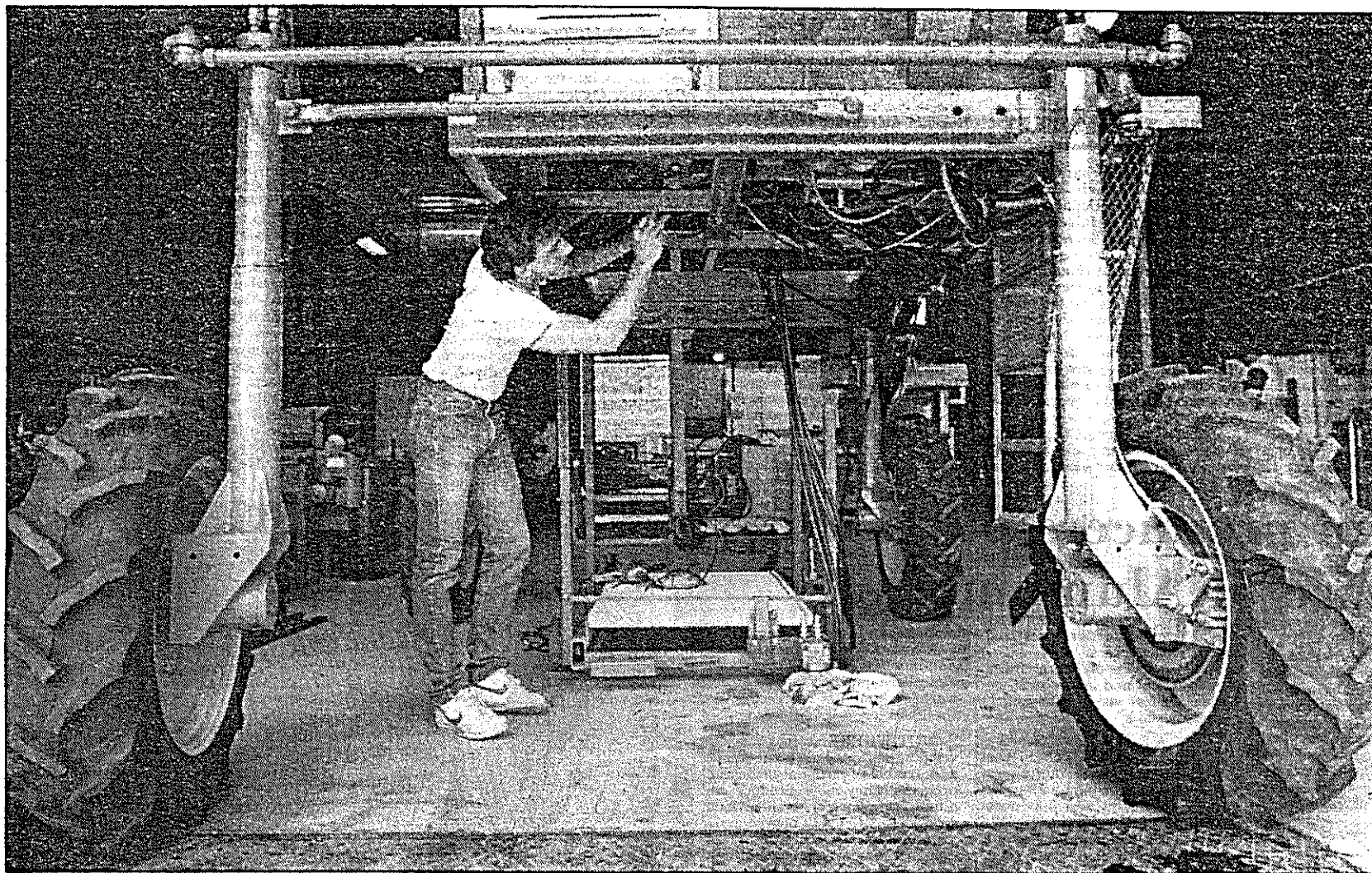
- Tomato Sorter. An automated machine has been designed by agricultural engineers to sort tomatoes using vibration technology. Tomatoes proceed down a conveyor belt to a station where two vibrating metal shafts detect which tomatoes are ripe. The vibrating shafts are able to determine the softness of the tomato. Those that are too hard, the ones that aren't ripe, are ejected from the machine.

- Soil Compaction Instrumentation. Agricultural engineers are developing an instrument to measure soil compaction, a problem plaguing many farmers in Ohio and in other states and nations. The engineers' concept is to blow air through soil samples -- the more air that gets through the soil, the less compacted it is. Microprocessor-based flow meters record the amount of air traveling through the soil.

- Waste Utilization. Scientists have engineered a treatment system to detoxify animal processing waste water and create two usable byproducts. The waste is pumped through a bioreactor where bacteria "eat" 70 percent of the contaminants and produce methane gas and a single cell protein. A personal computer monitors the operation and collects treatment data. A local meat processor has built a pilot processing plant based on this technology.

More information on the Agricultural Engineering Building, faculty research projects and their applications, is available from Holmes.

UNIVERSITY COMMUNICATIONS



Agricultural engineering student Mark Morgan, of Valley City, Ohio, adjusts a nursery container handling vehicle

Dispatch photo by Craig Holman

## From stable to top drawer

OSU's ag engineers get world-class facility

By Tim White  
Dispatch Agribusiness Reporter

**F**rederick W. Ives knew Ohio State University needed new facilities for his agricultural engineering students. But in his wildest dreams the former department chairman could not have imagined the university spending \$11.6 million dollars on a building just for agricultural engineering. After all, in 1915 Ives was teaching farm power to 143 students in a horse stable, and his annual salary was \$1,600.

The agricultural engineering structure that Ives and a long string of OSU faculty and students longed for was dedicated on Friday. The state-of-the-art facility offers 92,500 square feet of classroom and laboratory space — enough to accommodate 2,000 students and 45 faculty members. The new building is chock-full of \$2.5 million worth of the latest electronic equipment for chemical analysis, calibration, measurement and computer-assisted design.

"IT'S A gem," said Warren Roller, chairman of the agricultural engineering department. "It's the best in the country and maybe the very best in the world."

Roller said the University of Kentucky has twice sent architects to see the facility. "They want their building to end up like this one," he said.

The equipment includes \$400,000 worth of Hewlett-Packard computers. There are walk-in chambers where the environment is completely regulated, a machine shop that houses a fleet of cut-away Kubota tractors and two acres of covered storage space. There is a deep pit to measure soil compaction and a cement-sided stream to test water flows.

It's a far cry from the \$25,000 capital improvements expenditure which Ives authorized when he became chairman of agricultural engineering in 1920. At the time the department was scattered around the campus. Offices were in Townshend Hall with the department of agronomy. Drafting courses were held in the home economics building, Campbell Hall. Home economics Professor Edna Noble White warned the unruly engineers not to spill their ink on the floors of her building.

**HOWEVER,** THE end of World War I brought with it a shortage of labor and work animals. Farmers were turning to tractors. By 1920 annual production of the new gasoline-powered work horses in the United States had grown to 203,000 units. Students were eager to learn about the new technology. The department's enrollment had grown to 557. Extension engineers taught more than 40 schools on tractors to farmers around the state.

With the tractor as the highlight, department activities focused on farm machinery, farm power, farm structures and drainage. At his wife's urging, Ives pushed through the addition of domestic engineering, which focused on farm water systems, lighting and labor saving appliances —

especially washing and ironing machines.

Returning from an agricultural engineering meeting in 1924, Ives was killed in a train accident in Chicago. He never saw the engineering building that was named in his honor the following year. The university built Ives Hall by joining the horse stable and the look-alike carriage building next to it.

"AT THE time it was the envy of other universities," said Robert G. Holmes, professor of agricultural engineering. However, by the time Holmes enrolled in agricultural engineering at OSU in 1956, Ives Hall was less than satisfactory. The old stable offered little laboratory space. Doorways and ceilings weren't large enough for modern farm equipment. The building had few outlets for electrical or steam power. Besides, it had become infested with cockroaches. A raccoon had set up residency in the basement.

"When the lights went out at night very few people hung around to do extra work," Holmes said. His adviser urged him to stick with Ohio State through his graduate years because within five years the college was due to build a new facility.

Twenty-one years later OSU's new Agricultural Engineering Building at 590 Woody Hayes Dr. is filled with students and equipment. Since January the building has held classes for degree majors in agricultural mechanics, offered by the College of Agriculture, and agricultural engineering, a program funded by the school of agriculture and administered by the Engineering College. Many students come from other agriculture college fields, like agricultural education, which require course work in mechanics or engineering.

"THE BUILDING was designed and built to give us the maximum amount of flexibility," said Holmes, who was chairman of the capital improvements committee that planned the building. The committee listed what department members wanted the building to provide in 1976. Diverse space requirements led the group to recommend huge laboratories so research projects and student exercises could be carried on at the same time. As space requirements change, the laboratories can be rearranged.

No longer is the tractor the center of attention for the department. Traditionally, about half the graduates go to work for farm equipment companies, but Holmes said the stagnant equipment industry has cut those numbers.

"Now the hot field is food systems," he said. "There are excellent opportunities to mechanize food processing. We teach students to heat, cool, grind and mix foods. They learn to design automatic control systems."

A WASTE utilization project at the school enables scientists to detoxify waste water from animal processing. A bioreactor is the key to the system in which bacteria consume 70 percent of the contaminants. Meth-

The new building is chock-full of \$2.5 million worth of the latest electronic equipment for chemical analysis, calibration, measurement and computer-assisted design.

ane gas can be collected from the reaction.

In the mechanization laboratory research ranges from a nursery container-handling vehicle to an automated belt that sorts ripe tomatoes from hard tomatoes or separates potatoes from rocks.

Researchers are blowing air through soil samples to measure soil compaction. Micro-processors record the flow of air through the soil. "How can you determine how much damage heavy machinery is doing to the soil if you don't have a mechanism to measure that compaction?" asked Holmes.

**THE NEW** facility is expected to help lure top notch professors to Ohio's program. "It's been a big boost for the morale of the faculty," said

Please see

**BUILDING** next page



Dispatch photo by Kate Rhodenbaugh

**Todd Long Jr. works on a tractor transmission**

Joe Gliem, professor of agricultural mechanics. "Now we need to be held accountable for making the most of it." Already the facility has helped turn around a steady decline in the number of students majoring in agricultural engineering and mechanics.

"The payback on this facility to the state of Ohio will come from better trained students and from new designs for better equipment," Holmes said.

"We're the ones who can figure ways to make American farmers more efficient — just as the Japanese engineers have figured out ways to produce automobiles more efficiently," said Roller. "You can increase efficiency by increasing the number of units. That's happened to agriculture to such an extent that we now have a surplus on the market. Our goal is to improve efficiency without adding to the number of units."

Roller said that could be done by applying and managing inputs better. Holmes said engineers are looking for new crops and production methods.

"Maybe it's a crop that can be used for adhesives or plastics or 2-by-4s," Holmes said. "If just one of those pans out, we would quickly retire the cost of this building. The benefits will be passed to Ohioans who use the products as well as farmers, agribusinesses and all those who employ OSU agricultural engineering students."

# NEW BUILDING AIDS AG ENGINEERING RESEARCH

by Tom Spring

When scientists develop processes that save money, it makes the investment in that research look good.

Each year, Ohio farmers leave \$60 million to \$100 million worth of corn and soybeans in the field because of harvesting losses, said Robert Holmes, professor of agricultural engineering at Ohio State.

If engineers can design equipment to recover 20 percent of that, Holmes said, Ohio farmers should reap enough economic benefit to offset the costs of Ohio State University's new agricultural engineering building.

The \$12 million facility on Woody Hayes Drive opened in May and will permit research on projects faculty only dreamed about before, said Holmes.

The 92,500-square-foot building will enable engineers to perform research into

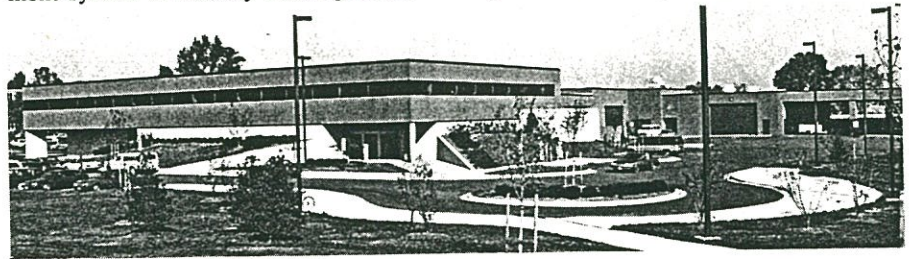
more productive harvesting, better drainage, development of water supplies and new and more efficient methods of processing food.

Today, researchers have designed such things as a mechanized vehicle to load and unload nursery containers and an automated machine to sort tomatoes. Agricultural engineers are developing an instrument to measure soil compaction, a problem many farmers face, and a treatment system to detoxify animal process-

ing waste water and create two usable byproducts.

Studies are being conducted on Scioto River Valley ground water quality, improved pesticide application systems, a corn cob burning heating device and greenhouse energy conservation.

In addition to teaching and research facilities, the two-story building also houses offices for faculty and staff and the international Virgil Overholt Agricultural Drainage Hall of Fame.



**THE AGRICULTURAL ENGINEERING BUILDING**

**P**ROMISING RESEARCH IN food engineering, land drainage, water quality and other areas makes the agricultural engineering department an exciting place these days.

So says new department chair Dr. Robert J. Gustafson, former agricultural engineering professor at the University of Minnesota. He shows his own excitement and enthusiasm as he talks about his department's many strengths. Gustafson replaces Dr. Warren L. Roller, who became coordinator of program development at the Ohio Agricultural Research and Development Center in Wooster.

"We have good integration of teaching, research and extension activities here," he says with a smile. "And our department is diversified, offering students a broad spectrum of agricultural engineering areas."

Other departmental assets include good faculty, a new \$11.6 million building featuring the newest electronic equipment, and a "rich tradition."

"We're seeing a lot of retirements and

## Agricultural Engineering

losing some superb people, but this gives us the opportunity to hire new faculty and build up the department even more," he says.

In another development, the department has begun emphasizing food engineering research in areas such as aseptic packaging, which allows preservation of meat and other perishables without refrigeration, Gustafson says.

Machine vision, another research area with good potential, could make Ohio's nursery industry more efficient and profitable, he says. This technology, which relies on cameras, could assist in automating the pruning, selection and harvesting of nursery crops.

Meanwhile at the OARDC, agricultural engineers search for new energy-

saving technologies that could allow greenhouse operators to grow produce more economically.

"If we can raise tomatoes and other produce in Ohio year-round without high energy costs, it's to our advantage," he says. "We want to be able to do it at prices competitive with other states."

While he believes research is valuable, Gustafson considers education to be the department's most important mission. The American Society of Agricultural Engineers honored Gustafson for his educational contributions by giving him the A. W. Farrall Young Educator Award in 1984. "I put a high value on education at the undergraduate and graduate level," says Gustafson, who taught for 12 years at Minnesota.

Gustafson, who grew up on a dairy farm in Coal Valley, Illinois, considers his field to be ideal because it combines his two favorite interests: agriculture and engineering.

Specializing in farmstead electrical system research, he has extensively studied the problem of "stray voltage" on livestock farms. This phenomenon, which can result from faulty wiring or equipment in buildings, for example, causes small amounts of electricity to pass through cows or other livestock, he says. As a result, the animals suffer health problems and give less milk.

His other research areas include grain drying and storage and the effects of electrical transmission on agriculture.

Although he enjoys his work, Gustafson confesses to sometimes missing the rural life he knew as a youngster. "I liked working with livestock and getting ready for spring plowing, but not the twice-a-day milkings."

Despite his busy schedule, Gustafson serves on many committees of the ASAE and belongs to the National Association of Colleges and Teachers of Agriculture and the Institute of Electrical and Electronic Engineers, Power Engineering Society. A prolific author, he has written a textbook on farm electrification and many professional articles.

An associate editor of the "Transactions" of ASAE, he belongs to the honoraries Alpha Epsilon, Gamma Sigma Delta, Sigma Tau, Sigma Xi and Omicron Delta Kappa.



Gustafson

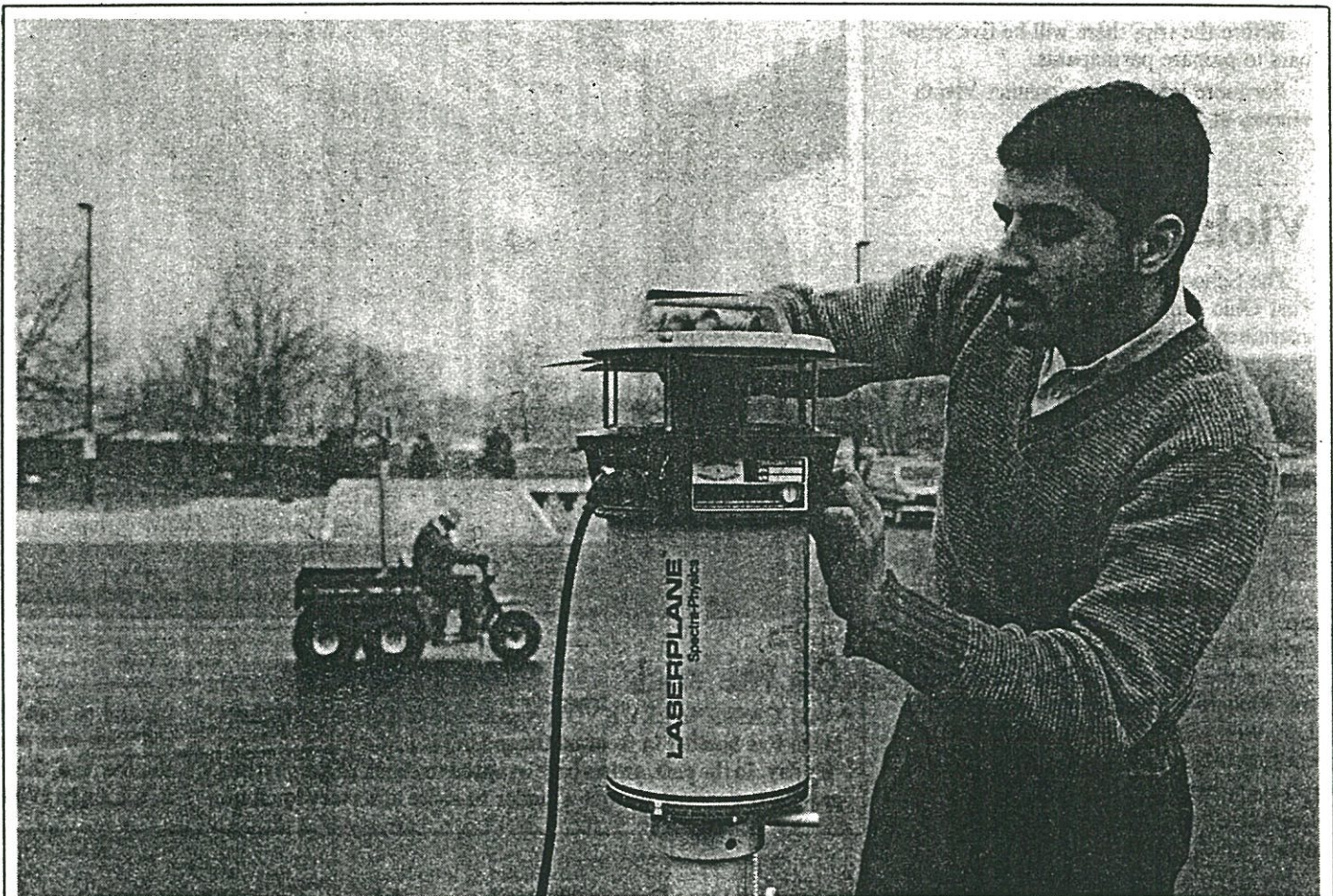


Photo by Lloyd Lemmermann

## Mark the spot

BY ADJUSTING THE SIGNAL, graduate student Amgad Elattal in **agricultural engineering**, above, guides a field vehicle driven by U.S. Department of Agriculture technician Don Wuertz in a test of a laser positioning system. Elattal, of Egypt, adjusts a transmitter sending signals that are processed by a computer

on Wuertz's vehicle. Robert Holmes, professor of agricultural engineering, and Greg P. Gordon, instructor at A.T.I., developed the system to control the elevation of machines such as graders, ditchers and tractors. Gordon now is working on a prototype that will create a map for machines to follow.

# Ohio State is hoping to revamp high school agricultural program

By Jane Schmucker  
Lantern staff writer

Ohio State is creating a program it hopes will be the prototype for high school agricultural curriculum across the United States.

Rich Brill, a former high school agriculture teacher, has a special appointment in OSU's agricultural education department to develop a new agricultural curriculum that will be tested next year at Canal Winchester High School. Canal Winchester is in southeast Franklin County.

Brill's program offers classes in science, communications and business with an emphasis on agriculture as well as some traditional mechanical and animal production classes. He said students preparing for careers such as microbiology, accounting and journalism could benefit from some of the new classes as well as students entering more traditional agricultural careers.

Dick Hummel, an area agricultural education supervisor with the Ohio Department of Vocational Education, said Canal Winchester made the right decision to allow Ohio State to make major changes in its program.

"He (Brill) is setting the pace for what will be happening across the country," Hummel said.

HUMMEL PREDICTED the program will be picked up by 50 Ohio high schools in the next 10 years.

Opposition to the program has come mostly from full-time farmers who are afraid the new program will not give students the skills they need to farm, he said.

"Once they learn more about the program they usually become supportive," Hummel said.

A graduate of Canal Winchester with four years of vocational agriculture experience there, Hummel is pleased with the new program that includes hands-on skills as well as scientific experience. Operating power equipment and welding were two examples he cited as important in many careers.

To make his program more attractive to students, Brill formed a student advisory board made up of the presidents of student organizations at Canal Winchester. They helped evaluate his ideas and publicized the program among students.

SOMETHING MUST have worked. More than 150 of Canal Winchester's 300 students said they were interested in taking agriculture classes next year. Brill

said the interest has spread over all areas, but communications classes were the most requested. He said scheduling would only allow about 80 students to take classes.

Last year, only a handful of students at Canal Winchester were interested in scheduling vocational agriculture classes.

Canal Winchester is the home of several current and former agricultural education administrators. They turned to Ohio State for help.

L. H. Newcomb, agricultural education department chairman, had been thinking about major changes for high school agriculture for several years. Newcomb said he wanted to keep the leadership and communications that made vocational agriculture strong, but replace the farm production emphasis with scientific laboratory experiences.

"My real dream was an advanced placement agriculture course to challenge the minds of the best and the brightest students and change the image of agriculture," Newcomb said.

AFTER MEETING with administrators from Canal Winchester, Newcomb asked Brill to plan and institute a new curriculum at Canal Winchester. Vocational agriculture classes were suspended this year.

Newcomb had observed Brill during his first year of vocational agriculture teaching at Fairbanks High School, located west of Franklin County, and was impressed with his abilities.

Brill taught vocational agriculture at Fairbanks for two years after graduating from Ohio State with a degree in agricultural education. His students won many state and national contests and held officer positions in the Future Farmers of America, a national organization for high school agriculture students.

"I enjoyed Fairbanks," Brill said. "But I couldn't turn down the opportunity to create something better."

Susan Lokai, a junior from Springfield majoring in agricultural education, said she wants to teach in a school with a program similar to the Canal Winchester proposal.

"I THINK it's long overdue," Lokai said. "This will change the way people think about agriculture. The sows-and-plows type programs won't be able to survive the changes in agriculture today unless they keep up with the times."

# OSU student wins agricultural engineering award

**By Doug Peterseim**  
Lantern staff writer

An OSU agricultural engineering student has been named national runner-up in the Student Agricultural Engineer of the Year competition. The annual award is given to the outstanding junior or third-year college student by the American Society of Agricultural Engineers.

Kevin D. Pees, a senior from Dola, submitted the application for the award in June and was notified of his selection as runner-up during the first week of September.

The first-place award went to Brian J. Fischer at Iowa State University.

As runner-up, Pees won \$125 cash award for use as travel expenses to attend the December ASAE International Winter Meeting in Chicago where he will be honored. Pees is this year's president for the Ohio Student Branch of ASAE.

Carol Flautt, membership and awards coordinator for the agricultural engineering society, said the competition is held annually for the top agricultural engineering students in the country.

"This competition has been going on for many years and is considered to be very prestigious," Flautt said.

Randall K. Wood, OSU assistant professor of agricultural engineering, and faculty adviser to the Ohio

Student Branch of ASAE, said this is the only award for agricultural engineering students during their academic careers.

Flautt said this year's competition included top agricultural engineering students from more than 60 universities.

Students file for the competition and then their applications are reviewed by a committee consisting of seven judges, Flautt said.

According to Flautt, the criteria used to judge the applicants includes excellence in scholarship, outstanding character and personal development, activity in student organizations devoted to professional development, participation in overall

school activities, personal leadership qualities, creativity, initiative and responsibility.

Pees, who specializes in soil and water conservation, submitted a 500-word essay in the competition, which focused on environmental characteristics of agricultural engineering.

"It seems as though in the past we have made great technological advances and it appears to me that we are coming to a point where we need to start taking into account the effect of our advances on the atmosphere and environment around us, not only from an economic standpoint, but also from an environmental standpoint," Pees said.



Jeff Hinckley/Dispatch

Youngsters inspect a tractor for safety hazards as part of a training exercise at the Farm Science Review.

## Frankie teaches safety at review

LONDON, Ohio — A tractor rolled over at the Farm Science Review yesterday — not once, but dozens of times. Frankie, the farmer driving the tractor, came out of each accident with a smile on his face.

Frankie is a stuffed doll, and the tractor he was driving was a one-quarter scale version of the real thing.

Ohio State University agricultural engineering senior Steve Dobbins designed the tractor to demonstrate safe-driving equipment and techniques. He is showing off the tractor to a captive audience at the review — in a tent where farmers wait to drive John Deere tractors.

The review, at the Molly Caren Agricultural Center near here, is a trade show for farmers. It ends at 4 p.m. today.

Dobbins' safe-driving demonstrations coincide with National Farm Safety Week, which began Sunday. The National Safety Council ranked farming as the most dangerous occupation in the most recent statistics, said Tom Bean, OSU agricultural engineer.

The council estimated the death rate among agriculture workers at 44 per 100,000, with 1,400 deaths and 140,000 disabling accidents in 1991.

Tractor rollovers account for more than half of the tractor accidents nationally, with 5.1 deaths per 100,000 tractors, according to the council.

During the last five years in Ohio, 77 tractor overturns resulted in 54 deaths, Dobbins said. From January to July 1992, nine Ohioans have died in 12 rollovers.

"Most people will die in a tractor rollover," Dobbins told his audience. "Tractors today are all made with rollover protective structures. If you keep it on and in place and wear your seat belt, it will save lives."

A rollover protective structure is a rectangular bar behind the tractor seat that is higher than the driver's head. If the tractor rolls over, the bar prevents the driver from being crushed. Dobbins modified a toy tractor and designed it to be one-quarter scale in dimension and weighting proportions. He added a remote-control device to help Frankie drive.

Frankie was "crushed" when he descended a steep

hill at an angle, rather than straight down. He was moving fast, his wheels were turned, and the field was rough. Frankie was crushed again when he tried to pull an immovable object. He disregarded signals that should have told him his tractor was too small to handle the load.

Frankie was protected by the rollover bar, but many Ohio tractors don't have them, Bean said. "Tractor dealers make equipment that lasts a long time. The average age of farm tractors is about 23 years, which means we have some that are a lot older."

Rollover protective structures didn't become standard on tractors until the mid-1980s, he said.

Bean commandeered another demonstration at the review to help show other safety hazards on tractors.

He "booby-trapped" a tractor with 25 safety errors. Vocational agriculture students were challenged to find what was wrong with it. "We hope to get some of the safety attitude instilled at an earlier age," Bean said. "This also is an effort to get the vocational agriculture teachers in tune, so that it's a part of their program and that they spend time teaching safety."

## OSU student demonstrates tractor safety

By Tonya Ewing  
Lantern staff writer

A farmer whose truck was mired in mud walked to the nearby barn, hopped on his tractor and drove back to the field. He hooked the chain to a high point on the tractor, hoping it would give him good leverage.

In less than three seconds he was lying on his back and the tractor had rolled on top of him. This scenario is tragic and all too familiar on America's farms.

Steve Dobbins, an Ohio State agricultural engineering student, hopes his research will put an end to such stories.

By use of "Roll-over Rover," a child's pedal tractor he converted to remote control, Dobbins hopes to illustrate to farmers how overturns occur.

Dobbins rebuilt the pedal tractor as part of a senior design class project.

"Tractor overturns are the most common farm accident and the number one killer of farmers," said Tim Lawrence, Ohio State associate safety specialist.

Ohio State Farm Safety Specialist Tom Bean and Lawrence funded the project with \$800. Dobbins supplied the idea and more than 400 hours of labor. The College of Agriculture provided a machine shop and machinist.

Dobbins also constructed a platform that included a 14-degree slope with a chain hooked to it.

He put together a demonstration for John Deere at the 1992 Farm Science Review in September. He demonstrated backward overturns by hooking the tractor to the chain and he demonstrated side overturns by driving the tractor down the slope at an angle.

Robin Ungerleider, public affairs director for the National Safety Council, said the national tractor overturn death rate was 4.5 per 100,000 tractors in 1991. Tractor overturns accounted for 47 percent of all farm tractor fatalities in 1991.

The National Safety Council lists agriculture as the nation's most hazardous industry.

At least 22 people died in tractor overturn accidents in Ohio last year, Lawrence said. Nine of 12 tractor overturn victims have died in Ohio in 1992 between January and August, Dobbins said.

Dobbins said he hopes his demonstration will make all the tractor operators more aware of tractor overturns so that the number of victims becomes smaller.

He is planning to take his demonstration on the road to rural high schools and the Power Show Ohio in February at the Ohio State Fairgrounds.

# Grant aids technology for disabled farmers

**By Adam Barbee**  
Lantern staff writer

About 270,000 agricultural workers in Ohio have physical disabilities that interfere with their work. Many dream of going back to work so they can lead an independent lifestyle.

The Ohio AgrAbility program is making some of these dreams come true. It modifies farming equipment, such as putting a lift on a tractor, building a truck that can be operated without the use of legs and making a fence open automatically.

In 1995, Tom Bean, professor in the Ohio State Department of Food, Agricultural, and Biological Engineering, was awarded an \$81,000 grant by the U.S. Department of Agricultural Extension Service to start the project.

The program, located in the agricultural building on Woody Hayes Drive, is the only one in the nation that visits an individual's residence, assesses what is needed and then modifies their equipment.

Mike French, assistant technologist; Robert Stafford, president and chief executive officer; and Tom Stannard, student assistant, develop and perform the modifications. OSU students are also sometimes involved in the work.

For the last two and a half years, they have done work for 100 quadriplegics.

A quadriplegic man wanted to return to the days when he was able to lift feed, scoop manure and move around his farm.

With a wheelchair this would be impossible, but with a modified small tractor he could do these chores.

The 6-foot-7-inch man had lost the ability to move his legs and arms, but was able to slightly move his shoulders.

The team focused on that and designed a shoulder-height control panel on the tractor.

"We try to focus on what the individual can do and not on what his disability is," said French. "If we focused on his disability, we would never get anything accomplished."

The team is trying to help as many people as possible, but the organization's work is not widely known. However the team plans to transport equipment to fairs and shows, and make on-site modifications for disabled farmers.