



Potato storage research shows promise for boosting grower profits

What may be one of the most important secrets in the potato industry is beginning to gain wider notice among Idaho growers. Storage bay fans equipped with variable frequency drives (VFDs) not only dramatically reduce energy consumption and utility costs, they also maintain product quality better than conventionally controlled fans. When last surveyed in 2001, fewer than 10 percent of potato storage facilities were equipped with this proven technology that can pay for itself in the first year and increase profitability thereafter. That's beginning to change.

A variable frequency drive is a shoebox-sized control panel that converts standard AC current from a steady 60 Hertz to DC current that can be modulated from zero to 60 Hertz. This allows ventilation fans to operate at variable speeds and more precisely meet storage needs and conditions.

The result? Instead of drawing full power at all times, a VFD equipped fan can run at slower speeds and use a fraction of the power. For example, a fan running at 50 percent speed requires about one-eighth the energy of full speed operation. And statistics being compiled at the University of Idaho's Kimberly Research Station show that constant, variable air flow does a better job of keeping potatoes fresh than traditional 12-hours-on, 12-hours-off cycling.

Now in the third and final year of full-scale field trials near Burley, UI researcher and Ph.D. candidate Nathan Oberg reports positive impacts of VFDs on an average grower's bottom line. "The energy savings alone yield full return on investment within 1.8 years," says Oberg. "With

the improvements we're seeing in potato quality, 100 percent ROI should drop to 12 months." In the first year of trials, shrinkage of Shepody potatoes was reduced by 17 percent—and Russet Burbanks by 11 percent—without any negative effects on mass, bruise resistance, sugar levels, and other standard potato metrics.

"Twin storage bays are equipped with dozens of sensors that take readings every 30 minutes," Oberg explains. "The control pile has regular fans, while the other has VFDs." In addition, 100 potato sample bags in each bay are regularly compared and analyzed for differences.

"We're getting excellent data about what's going on inside the piles," Oberg says, "and that means we can determine exactly the right amount of air flow."

The Northwest Energy Efficiency Alliance (NEEA), an organization of industry representatives, utilities, governments, and consumer groups that promotes energy efficiency via market forces, sponsored Oberg's recent presentations to the Idaho, Oregon, and Washington Potato Conferences. He notes that "the increased level of interest from the industry over the past year is amazing."

"Until 2001, fewer than one percent of ventilation contractors knew anything about VFDs," says engineer Steve Koski of Cascade Energy Engineering. The Walla Walla firm, which provides utility companies with energy analyses of end users, is collaborating with UI potato researchers under a grant from NEEA. "Now, virtually all of them will bid on VFD installations. Within five years we



Photo by Pam Benham

UI's Nathan Oberg describes a VFD.

expect that all new buildings will have VFDs."

Retrofitting existing facilities is easy according to Koski. "The VFD control panel splices into the circuit between the fan and the power switch. It's usually mounted on the same wall with the rest of the wiring." In some cases, output or line-side reactors are added to protect fan motors from voltage spikes. "The cost of VFDs typically falls in the range of \$100 to \$200 per installed horsepower," adds Koski. (The UI study used \$175 per horsepower to calculate return on investment.)

With an estimated 80,000 ventilation horsepower online in the Northwest, energy savings, decreased power grid loads, and reduced pressure to add generating capacity constitute a significant boon to the region's economy. The prospect of shoring up sagging potato profits, as well as the possibility of utility company subsidies for installing VFDs, is creating a lot of interest among Idaho growers.

"In my opinion, this is one of the greatest public-interest projects I've run into in a long time," says Gale Kleinkopf, UI potato physiologist and superintendent of the Kimberly Research and Extension Center, who coauthored the research. "It has the potential to change the way we do business in potato storage."