ethanol

A typical day at an ethanol plant

This 40-million-gallon plant needs 34 dedicated workers to run it

Photograph: Ted Schlaebitz

For KAAPA Ethanol near Minden, Nebraska, it all starts with this 1,000-bushel load of corn headed for the scale between the office (far right) and dump pit at the right side of the grain silos.

Josh Frizzell watches a video monitor as he guides a grain sampling tube into a truckload of corn idling near the scale at KAAPA Ethanol.

It's a few days before Christmas at the Minden, Nebraska, plant. One of two 200,000-bushel grain tanks is being cleaned. So Frizzell, the plant's commodity assistant, isn't working the 100-plus trucks he might see before or after a storm. It's a more typical day of 65 incoming loads.

"We contract on a per-month basis," he explains as corn clatters into a large copper jar behind him in the scale room. The jar splits the sample before Frizzell checks for moisture, test weight, and quality.

He schedules deliveries a week out, he says. Contracts can be for a flat price, the basis, or futures. "We're pretty much like an elevator."

Unlike an elevator, the corn leaves in liquid form, as ethanol pumped into rail tank cars just west of the dump pit where Frizzell sends the trucks. Or it crosses the scale again in outbound trucks as wet cake, the high-protein feed left after distillation. Then Frizzell fills out more weight tickets.

Maintaining microbes

About a block from the ranch-style office where Frizzell works is the 40-million-gallon ethanol plant that almost never stops. Outside, it is deceptively quiet. Inside, maintenance chief Mark Olson is overseeing repairs of broken pumps, scheduling maintenance up to a year out, and, with six others on his crew, just listening for trouble.

Around the corner from Olson's neat office, lab manager Rick Thaden is testing a mustard-colored sample of mash drawn from a fermentation tank.

He checks on how much alcohol the yeast cells have made, how much sugar they have left to eat, and if there are too many toxins like salt or acetic acid (vinegar) in the brew. With a microscope and a blood cell tester used in hospitals, he even counts the number of yeast cells that are alive, are dead, or are budding new cells.

Next to Thaden's lab, the plant's lead operator Nick Schommer sits in front of two 20-inch flat screen monitors and watches color diagrams of everything going on in the plant.

"If you ask most people, they'd say I sit here and do nothing," Schommer jokes, turning away from the color screen briefly.

Although almost 90% of the plant runs automatically, Schommer must watch 28 different pull-down screens that show how everything is working. He can change the flow of water and corn through the plant, adjust temperatures, and alter pressures in tanks.

"In a sense, it's like a big video game – a $57 million video game,"

Schommer says. “The object of the game is to balance the plant out.”

Today Schommer slows the corn moving through the hammer mill. The plant has a 17% limit on moisture, but the corn is wetter than ideal. “If you get wet corn, the amps on those hammer mills will go way up,” he says. He looks at the other screen. “This is our molecular sieve page. I always have it up. These molecular sieves are kind of like a high-maintenance woman.” Each of the three sieves has about 20 different valves and constantly switch from high pressure to a vacuum.

Schommer’s job might best be described as 12 hours of nervous anticipation. But at least he’s not alone. For eight hours of his shift, he’s got backup. “We’ve got a really good maintenance team here,” he says. “You don’t have to but say a pump is down and they’ll have five guys there.”

Plant doctors always on call

Even with the laboring hammer mill, Mark Olson, a 10-year veteran of the ethanol industry, has no big repairs this day. He walks past his repair shop – where his crew of welders, mechanics, and electricians can fix almost anything – to the boiler room. He’s gotten a job order to fix a steam leak. Sure enough, a plume is shooting 2 yards out from an 8-inch pipe under 115 pounds of pressure per inch.

Olson and the plant management try to limit plant-wide maintenance to two 12-hour shutdowns a year. To avoid another shutdown, he’ll use a flange repair kit to inject sealant under pressure into the steam leak.

“We’re all on call 24 hours a day,” Olson says. “For the most part, we don’t have a problem because we have very few breakdowns. We’ve done a couple pumps in the middle of the night. We have spares and when the damaged ones come out, we do in-house rebuilds.”

The plant has 73 different pumps, many custom-designed, that move water, alcohol, slurry, and other products. Sometimes, one fails.

His crew checks everything daily.

“We start at one end of the plant and go through it,” he says. “They’re going to listen to all of the pumps, all of the motors, all the gearboxes, the critical pieces of equipment.”

One thing the maintenance crew can’t check is the health of the yeast. To do that, Rick Thaden uses high-pressure liquid chromatography, a lab-testing machine that recognizes chemicals with light.

“We pull samples from the fermenters every five hours at first,” he says. “If it’s lagging a little bit, we can catch it and give it a little boost, whether we give the yeast either some enzymes or some urea.” (Urea is a source of food.)

Early-morning tweaking

Dave Gerhart, the plant manager, knows the importance of those tests. “Basically, when you’re making alcohol, what you’re really doing is making yeast,” he says. “You’re trying to make everything so that conditions are as good as possible.”

To do that, Gerhart is in the office at 6:30 a.m., checking Thaden’s lab reports, any trouble Schommer or the night operator have seen, and reports from Olson.

Gerhart, who can run the plant from his computer, adjusts all of the valves before putting the plant on automatic. He has 22 years of experience in the industry, including two at ICM, Inc., the firm that designed KAAPA Ethanol. “There’s no book that really teaches this,” he says.

Making it all pay

Finally, someone has to make sure all this is profitable. Day-to-day, that’s the job of Rick Sorensen, the commodity manager whose office is next to Josh Frizzell’s scale room

A broker actually sells the wet cake, and a Minneapolis cooperative marketer sells the ethanol. But Sorensen must order the tank cars for the ethanol, track its progress by train, and manage all corn buying.

This morning he’s on the phone with a farmer who wants to sell December 2007 corn at $2.60 a bushel. Then he’s calling the plant’s broker. While he’s at it, he checks on the futures price for natural gas. “We hedge natural gas, corn, wet cake – all of it is hedged,” he says.

“Some days are hectic more than others,” he says, leaning back in a brief break of phone calls. “It depends on what the markets are doing. Today is one of those days.” ❑